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**REVISION OF THE AFRICAN LIZARDS OF THE
FAMILY GERRHOSAUROIDAE**

By ARTHUR LOVERIDGE

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No. 11. —Revision of the African Lizards of the Family Gerrhosauridae¹

BY ARTHUR LOVERIDGE

Except for Hewitt (1915, p. 103) having published a key to the seven species of *Tetradactylus* known at that time, and later Schmidt (1919, p. 518) doing the same for *Gerrhosaurus*, no attempt has been made to evaluate the twenty-three species of this family described during the fifty-five years which have elapsed since the treatment of the GERRHOSAURIDAE in Boulenger's (1887a, p. 119) monumental "Catalogue of Lizards in the British Museum."

In the present paper, therefore, it has been my endeavour to furnish a synopsis of all additions to our knowledge of this group since 1887. The treatment followed being the same as that adopted in other papers of this series², it appears unnecessary to repeat the procedure here.

For the purpose of this revision I have utilized the extensive material in the Museum of Comparative Zoölogy, supplemented by loans from the American Museum of Natural History, Field Museum of Natural History and the University of Michigan Museum of Zoology. I take this opportunity of expressing my thanks to the curators, Mr. Bogert, Mr. C. H. Pope, and Mrs. H. T. Gaige for their friendly co-operation in this matter. I am also indebted to Mr. V. FitzSimons of the Transvaal Museum for answering numerous questions regarding the wealth of material of this group which he has collected. Owing to unsettled conditions in Europe other queries have remained unanswered and will have to remain so.

One of those that may never be satisfactorily settled is the status of *Gerrhosaurus dulignoni* Rochebrune. Type locality: Dakar; (1884a, Faune de la Senegambie, p. 110, pl. xii, fig. 2), striped with red above and said to be heavenly blue below. The figure is undoubtedly that of a *Gerrhosaurus*, yet no species of the family is known from west of Togo except for Rochebrune's listing of *typicus* (p. 109), *nigrolineatus* (p. 108), *bibroni* (p. 109, pl. xii, fig. 1), and *flavicularis* (p. 108), each with definite localities. In consequence, perhaps, the following year, Müller (1885d, p. 703) listed *flavicularis* from Liberia, though on the West coast there is no other record nearer than Cape Province!

With the exception of these references, which I have ignored, I have included all those on GERRHOSAURIDAE resulting from a search

¹ Published with the aid of a special gift from Mr. George R. Agassiz.

² Revision of the African Lizards of the Family Amphisbaenidae, 1941, Bull. Mus. Comp. Zool., 57, pp. 353-451.

Revision of the African Terrapin of the Family Pelomedusidae, 1941, Bull. Mus. Comp. Zool., 58, pp. 467-524.

of 1500 papers on African herpetology. Undoubtedly others, chiefly anatomical, will have escaped me.

Apart from the allocation to subspecific rank of a number of forms, and the description of a new race, *Gerrhosaurus flavigularis fitzsimonsi*, the only taxonomic changes are the synonymizing of the under-mentioned species:

Gerrhosaurus cipriani Scortecchi = *G. v. validus* A. Smith
Gerrhosaurus v. damarensis FitzSimons = *G. v. maltzahni* de Grys
Gerrhosaurus f. intermedia Lönnberg = *G. n. nigrolineatus* Hallowell
Gerrhosaurus n. australis FitzSimons = *G. n. nigrolineatus* Hallowell
Gerrhosaurus trivittatus (Peters) = *C. subtessellatus* (Smith)
Cordylosaurus t. australis Hewitt = *C. subtessellatus* (Smith)
Tetradactylus lundensis Monard = ? *T. f. boulengeri* de Witte

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* Represented in the collections of the Museum of Comparative Zoölogy; examples of species without asterisk are earnestly desired.

Family GERRHOSAURIDAE

1884a. *Gerrhosauridae* Boulenger, Ann. Mag. Nat. Hist. (5), **14**, pp. 120, 122.

For synonymy see Boulenger, 1887a, Cat. Lizards Brit. Mus., **3**, p. 119, from whom the following definition is adapted and amended.

Habit robust, moderate, or vermiform; head covered with symmetrical shields; eyes present; eyelids well developed; tympanum distinct; dentition pleurodont, teeth closely set, hollow at the base, with long cylindrical shafts and conical or bicuspid crowns, pterygoid teeth often present; tongue moderate, elongate, arrow-headed, bifid posteriorly, covered with imbricate scale-like papillae or oblique plicae converging towards the median line; body with squarish or rhomboidal imbricate scales, forming regular longitudinal and transverse series (in African but not in all Malagasy species); a lateral fold covered with granular scales (except in the Malagasy genus *Tracheloptychus*); limbs well developed or rudimentary or absent posteriorly; femoral pores present or absent (in some serpentiform species); tail long and fragile.

Skull similar to that of the LACERTIDAE in every respect, with dermal ossification roofing over the supratemporal fossae; body furnished with osteodermal plates underlying the scales and showing a system of longitudinal tubules intersecting a transverse one as in the SCINCIDAE, this structure being usually more distinct on the ventral plates than on the thicker and rougher dorsal ones; clavicle dilated and loop-shaped proximally; interclavicle cruciform.

Range. Africa south of Senaar, i. e. about 13° N.; Madagascar.

Remarks. Camp (1923, p. 316) places the GERRHOSAURIDAE in a superfamily Lacertoidea of the section Scincomorpha, division Autarchoglossa of the suborder Sauria, thus confirming Boulenger's conclusions as to the intermediate position which they occupy between LACERTIDAE and SCINCIDAE. His paper should be consulted for details.

Key to the Genera

1. Ventral plates not forming straight transverse series; nostril pierced between 2 nasals, first labial, and the rostral; range: Madagascar.
Malagasy genera
- Ventral plates forming a perfectly straight transverse series; range: Africa 2

2. Tongue¹ covered, or nearly covered with imbricate scale-like papillae; nostril pierced between 2 nasals and first labial; limbs well-developed; femoral pores present. 3
Tongue covered with oblique plicae. 4
3. Prefrontals and frontoparietals present; lower eyelid scaly; subdigital scales smooth or tubercular. *Gerrhosaurus*
(p. 488)
Prefrontals absent; frontoparietals present (in young) or absent (in adults); lower eyelid with a transparent disk; subdigital scales keeled.
Cordylosaurus (p. 520)
4. Nostril pierced between 2 (rarely 3) nasals and first labial (latter rarely excluded); prefrontals absent; frontoparietals present; fore limbs present or absent; femoral pores present or absent. *Tetradactylus*
(p. 523)
Nostril pierced in a single nasal (? or between it and first labial); prefrontals and frontoparietals present; fore limbs absent; hind limbs minute; femoral pores absent. *Paratetradactylus*
(p. 534)

Genus GERRHOSAURUS

1828. *Gerrhosaurus* Wiegmann, Isis von Oken, p. 378 (type *flavicularis*).
1836.² *Pleurotuchus* A. Smith, Mag. Zool. Bot. (Jardine), 1, p. 142 (type *typicus*).

For further synonymy see Boulenger, 1887a, Cat. Lizards Brit. Mus., 3, p. 120.

Tongue covered¹ with imbricate scale-like papillae; nostril pierced between 2 nasals and first labial; prefrontals and frontoparietal present; lower eyelid scaly; dorsal and ventral scales forming straight longitudinal and transverse series; a strong lateral fold; limbs well developed; subdigital scales smooth or tubercular; femoral pores present.

Range. Africa south of Senaar, i. e. about 13° N., Anglo-Egyptian Sudan.

¹ As at the time of writing the Museum of Comparative Zoölogy lacked an example of *Cordylosaurus*, I appealed to Mr. V. FitzSimons for his opinion. He replied as follows: "The scaling of tongue in our three genera of *Gerrhosauridae* appears to show a gradation as follows: in *Gerrhosaurus* tongue almost completely covered with scale-like papillae, oblique plicae being confined to posterior lobes; in *Cordylosaurus* papillae extend over anterior half of tongue and plicae over posterior half; in *Tetradactylus* papillae confined to tip or anterior quarter of tongue, remainder with oblique plicae."

² Aug. 1838 (not 1837), *vide* Sherborn, 1929, Index Animal., O-P, p. 5041.

STATISTICAL SYNOPSIS OF VARIATION IN THE GENUS GERRHOSAURUS

Species	Dorsal scale-rows longitudinally	Dorsal scale-rows transversely	Ventral scale-rows longitudinally	Ventral scale-rows transversely	Femoral pores on either side	Lamellae under fourth toe	Supraciliaries (unusual variations in parenthesis)
<i>v. validus</i>	28-34	50-56	14-20	40-44	17-25	18-22	5
<i>v. skoogi</i>	35	64	18-22	?	24-27	?	5
<i>v. maltzahnii</i>	25-30	50-55	12-14	41-44	20-24	15-22	5 (6)
<i>m. zeehi</i>	18-20	32-37	10	33	12-15	15	5 (3, 4)
<i>m. bottegoi</i>	17-20	33-36	10	32-34	10-17	13-17	5
<i>m. grandis</i>	16-18	32-36	10	30-32	10-13	12-14	5
<i>m. major</i>	17-21	32-38	10 (9)	31-34	12-14	13-16	5 (3, 4)
<i>typicus</i>	22-24	56-58	10	30-35	15-17	16-18	5
<i>n. auritus</i>	26	50-57	8	32-34	14-16	16-18	4
<i>n. nigrolincatus</i>	20-26	52-60	8	32-36	12-21	14-18	4 (3, 5)
<i>f. fitzsimonsi</i>	20-22	59-61	8	34-36	13-15	17-19	5 (6)
<i>f. flavigularis</i>	20-24	55-67	8	32-38	10-16	17-21	5 (6)

Key to the Species

1. Ventrals in 12 or more rows across belly 2
 Ventrals in 10 or less rows across belly 5
2. Subocular excluded from lip by labial; breadth of tympanic shield included
 in its depth from 2 (adult) to 3 (young) times 3
 Subocular reaches lip between labials; breadth of tympanic shield included
 in its depth from 1.5 (adult) to 4 (young) times 4
3. Dorsals in 30-34 longitudinal and 50-56 transverse rows; ventrals in 14-20
 longitudinal rows; femoral pores 17-25 on each side; lamellae beneath
 fourth toe 18-23; range; Orange Free State and Transvaal north to
 Southern Rhodesia and Mozambique *v. validus*
 (p. 492)

4. Dorsals in 35 longitudinal and 64 transverse rows; ventrals in 18-22 longitudinal rows; femoral pores 24-27 on each side; range: Port Alexander, Angola *v. skoogi*¹
(p. 494)
Dorsals in 26-30 longitudinal and 50-54 transverse rows; ventrals in 12-14 longitudinal rows; femoral pores 20-24 on each side; lamellae beneath fourth toe 15-22; range: South West Africa and Angola . . . *v. maltzahni*
(p. 495)
5. Ventrals in 10, *very* rarely 9, rows across belly 6
Ventrals in 8 rows across belly 11
6. Dorsals in 16-20 longitudinal and 31-37 transverse rows; laterals keeled and striated 7
Dorsals in 24 longitudinal and 55-56 transverse rows; laterals smooth . . 10
7. Head above, buff, each scale spotted with black 8
Head above, uniform buff or fulvous brown 9
8. Above head, body, and tail almost black, each scale with a small buff spot or streak arranged to form interrupted lines on back and sides; belly streaked with dusky; range: Belgian Congo and Togo *m. zechi*
(p. 497)
Above, head and body buff, each scale (except those forming an ill-defined, buff, dorsolateral line) heavily streaked with black or dark brown in regular lines on back and sides with a tendency to coalesce posteriorly and on tail where the buff survives only as spots; belly streaked with dusky; range: Central Tanganyika north through Kenya to Ethiopia and Eritrea *m. bottegoid*
(p. 498)
9. Above, head only buff though back anteriorly largely so, while posteriorly, as also on sides and tail, many scales are streaked with black or dark brown among which large buff blotches or spots are prominent; belly usually streaked with dusky; range: Zululand and Transvaal north to Morogoro, Tanganyika Territory *m. grandis*
(p. 500)
Above, head and body uniform buff or fulvous brown; belly uniform yellowish; range: Northern Rhodesia (?) and Mozambique north to Zanzibar along eastern Tanganyika Territory and eastern Kenya Colony
m. major (p. 502)

¹ This race is known to me only from the original description of the unique type. The possibility that its sharp cutting jaws and coloration are attributable to preservation and partial bleaching should not be overlooked. Apparent differences in number of dorsals etc., as compared with those of *maltzahni*, may in part be due to method of counting, in part to the fact that so few specimens of the latter are known that the range may yet expand to include those of *schoogi*, a name which has many years priority over *maltzahni* should they prove to be synonymous. Conversely, perhaps, Angolan records attributed to the latter should really be referred to the former.

10. Size smaller; range; Little Namaqualand *typicus*
(p. 505)
11. Supraciliaries 4, very rarely 3 or 5; distance from snout to behind ear included in distance from snout to anus 3.25 (hatchlings) to 4, rarely 5 (adults) times 12
Supraciliaries 5, very rarely 6; distance from snout to behind ear included in distance from snout to anus 4.8 (young) to 6¹ (adults) times 13
12. Uniform sandy brown above; range: more arid areas of Bechuanaland and South West Africa (with single questionable records from Angola and N. Rhodesia) *n. auritus*
(p. 506)
A pair of dark-edged, pale, dorsolateral lines; range: South West Africa, Bechuanaland and Transvaal north to Kenya highlands and west to Gaboon *n. nigrolineatus*
(p. 508)
13. Prefrontals *broadly* in contact, occasionally (20%) separated; range: Southern Tanganyika north through Kenya (chiefly coastal) to Ethiopia and Sennar *f. fitzsimonsi*
(p. 514)
Prefrontals separated or narrowly in contact; range: Cape Province east to Natal, north to northern Mozambique and Northern Rhodesia
f. flavigularis (p. 516)

¹to 8.4 times according to FitzSimons (1935b, p. 366).

GERRHOSAURUS VALIDUS VALIDUS-Smith

1849. *Gerrhosaurus vallidus* (sic) A. Smith, Illus. Zool. S. Africa, Rept., App., p. 9: Towards sources of Orange River, S. Africa.
- 1887a. Boulenger, p. 121 (amends spelling to *validus*).
- 1896a. Bocage, p. 98.
1898. Sclater, p. 105.
- 1909a. Chubb, p. 594.
- 1909b. Chubb, p. 35.
- 1910b. Boulenger, p. 480.
- 1910a. Hewitt, p. 62.
- 1910c. Hewitt, pp. 103, 104, 105.
- 1911c. Sternfeld, p. 417.
1913. Hewitt & Power, p. 157.
1920. Hewitt, pp. 91, 92, fig. 5.
1934. Pitman, p. 305.
1935. Broom, p. 20, fig. 5a.
- 1935b. FitzSimons, p. 362.
1935. Lawrence, p. 44.
- 1937a. FitzSimons, p. 269.
- 1939b. FitzSimons, p. 33.
1940. Malan, p. 192.
1854. *Gerrhosaurus robustus* Peters, Monatsb. Akad. Wiss. Berlin, p. 618: Tete, Mozambique.
1855. Peters, p. 47.
- 1864e. Gray, p. 58.
- 1864b. Peters, p. 377.
1865. Kirk, p. 227.
- 1882a. Peters, p. 58, pl. ix.
1931. *Gerrhosaurus ciprianii* Scortecchi, 1930b, Atti. Soc. Ital. Milano, **69**, p. 319: Old Enchopi, interior of Mozambique.
- 1934d. Scortecchi, pp. 51-54, photo.

Further citations of '*validus*' and '*robustus*' will be found under *G. v. maltzahni* de Grys.

Native names. *Caaua* (Sechuana: Peters)¹; *isigusa* (Matabele: Chubb).

Description. Head moderate, its length being included in the distance from snout to anus 4 (young) to 4.9 (adult) times; head shields smooth (young), feebly striated (halfgrown), or rugose (adult); rostral separated from, very rarely in contact with, the frontonasal; prefrontals broadly in contact; supraoculars 4; supraciliaries 5; sub-

¹ Misprinted *caaiia*, later corrected, disputed by Kirk, cf. 1864e, 1864b, 1865.

ocular excluded from lip by labial; tympanic shield narrow and band-like (young) or broad and subtriangular (adult); body cyclotetragonal or depressed; dorsals keeled, unicarinate (young), tricarinate (half-grown), or multicarinate (adult), and serrated, in 28-34¹ longitudinal and 50-56 transverse rows; laterals keeled and sometimes striated also; ventrals in 14-20² longitudinal and 40-44 transverse rows from pectoral to anal shields; femoral pores 17-25 on each side; fourth toe with 18-22 lamellae below; tail 1.3 (young) to 1.8 (adult) times the length of head and body.

Coloration. In this form the dark markings are so dominant that they assume the importance of the ground color, the arrangement followed is therefore the reverse of that adopted for *G. v. maltzahnii* and other species with the sole exception of *G. m. zeechi*.

Above, dark brown or blackish, head flecked and spotted with citron yellow; each dorsal scale with a citron yellow streak or spot on its inner edge; a broad, white, or lemon yellow, dorsolateral line from head to tail anteriorly, continuous in young, more or less interrupted and indistinct in adults; flanks with light vertical bars in young; limbs dark spotted with lighter. Below, throat, chest, and limbs whitish blotched with pale brown; belly and tail brownish or blackish with some white persisting as fine, light, longitudinal lines along the edges of the ventrals and subcaudals; soles of feet black.

Size. Total length of ♂, 681 (275 + 406) mm., of ♀, 509 (228 + 281) mm., both from Zimbabwe (FitzSimons).

Anatomy. The dentition, skeleton, and viscera have been described in detail by Peters (1882a), the branchial arch discussed by Hewitt (1920), temporal region of skull by Broom (1935), the skull by Malan (1940).

Remarks. Apparently Peters (1882a) was the first to point out that the shape of the tympanic shield varies with the age of the lizard. The type of *validus* in the British Museum has been recently re-examined by FitzSimons (1937a). Mertens (1937b) considers that the original spelling, *vallidus*, may well be considered a misprint.

Diet. Orthoptera (Peters). The native story that they eat fowls, repeated by Kirk, is undoubtedly due, as suggested by Peters, to its being confused with the Nilotic monitor (*Varanus niloticus*).

Parasites. Mites (*Pterygosoma gerrhosauri*) reported by Lawrence.

¹ 28 *vide* Boulenger (1887a), my lowest is 30.

² 18-20 (A. Smith) was corrected by Boulenger (1887a) to 14-16, which is also the range of material in the Museum of Comparative Zoölogy. 18-20 *vide* FitzSimons (1939b), who writes (1942) me that 14 and 20 occur exceptionally.

Habits. "A strictly rupicolous species, not uncommon on boulder-strewn hills . . . These large gerrhosaurids are somewhat clumsy of movement, and never venture far from their rocky retreats. When alarmed they disappear into the nearest crack or crevice, where they lie low until all danger is past. It is often incredible the narrow openings into which these large lizards can squeeze; here they wedge themselves so securely that nothing can dislodge them save lifting of a rock." (FitzSimons, 1935b).

Localities. **Mozambique:** Chifumbazi; Old Enchopi; Tete. **Southern Rhodesia:** Changadzi River; Devuli River Bridge; Empandeni; Insiza; Mt. Silozi, Matopos Hills; Zimbabwe. **Transvaal:** Woodbush. **Orange Free State:** Sources of Orange River.

Range. Orange Free State, north through Transvaal to Southern Rhodesia and Mozambique.

GERRHOSAURUS VALIDUS SKOOGI Andersson

1916. *Gerrhosaurus skoogi* Andersson, Med. Göteborgs Musei Zool. Afdel., 9, p. 10, fig. 2: Port Alexander, Angola.

Description. Head depressed, its length from back of parietal only being included in the distance from snout to anus 5.6 times (i. e. similar proportion to typical *validus* of this size whose head length, to behind ear, would be included in the distance from snout to anus 4.5 times); head shields smooth; rostral large, with sharp cutting edge, in contact with the frontonasal; prefrontals shortly in contact; supraoculars 4; supraciliaries 5; tympanic shield large, trapezoid; body almost cylindrical (obviously bloated); dorsals smooth anteriorly, feebly tricarinate and serrate posteriorly, in 35 longitudinal and 64 transverse rows; ventrals in 18-22 longitudinal rows; femoral pores 24-27 on each side; tail slightly shorter than the length of head and body (? reproduced).

The foregoing description is based on the original, which should be consulted for further details, for the race is known only from the unique type (Göteborg Mus. 1387) which I have not seen. The remarks in parenthesis above, have been added by me; for additional comments see footnote to the key on page 490. Should the race prove to be identical with *maltzahni* (1938), the name *skoogi* (1916) would have to take precedence.

Coloration. Above, head dusky; body grayish brown; margin of upper jaw, sides of neck, and forelimbs anteriorly, yet black; fore feet

white. Below, throat, breast and belly anteriorly black; middle and posterior portion of belly and underside of thighs, dusky.

Is it possible that this peculiar coloration is the result of bleaching, certain parts having been subjected to strong sunlight?

Size. Total length of type, 266 (136 + 130) mm.

Range. **Angola** (known only from type locality in southwest corner).

GERRHOSAURUS VALIDUS MALTZAHNI Grys

- 1862a. *Gerrhosaurus robustus* Peters (not Peters, 1854), p. 18.
- 1887a. Bocage, p. 203.
- 1869b. *Gerrhosaurus validus* Peters (not Smith), p. 659.
- 1895a. Bocage, p. 36.
- 1905c. Boulenger, p. 111.
- 1911d. Sternfeld, p. 35.
- 1929. Rose, p. 219.
- 1937b. Mertens, p. 8.
- 1937b. Monard, pp. 76, 77.
- 1938e. Mertens, p. 435.
- 1938. *Gerrhosaurus Maltzahni* de Grys, Zool. Anz., **124**, p. 58, figs. 1-2: Roidina Farm, South West Africa. (October 15, 1938).
- 1938. *Gerrhosaurus validus damarensis* FitzSimons, Ann. Transvaal Mus., **19**, p. 198, fig. 9: Paderburn Farm, South West Africa. (October 30, 1938).

Native name. *Combe* (at Quilengues: Anchieta).

Description. Head moderate, its length being included in the distance from snout to anus 4.7 (young) to 5 (adult) times; head shields smooth (young), feebly striated (halfgrown), or rugose (adult); rostral separated from the frontonasal; prefrontals broadly in contact; supraoculars 4; supraciliaries 5-6; subocular reaching lip; tympanic shield narrow and bandlike (young) or broad and subtriangular (adult); body cyclotetragonal or depressed; dorsals strongly keeled, unicarinate (young), tricarinate (halfgrown), or multicarinate (adult), and serrated, in 25-30 longitudinal and 50-55 transverse rows; laterals keeled and sometimes striated also; ventrals in 12¹-14 longitudinal and 41-44 transverse rows from pectoral to anal shields; femoral pores 20-23 on each side; fourth toe with 15-22² lamellae below; tail 1.5 (young) to 1.8 (adult) times the length of head and body.

¹ 12 in paratypes of *damarensis*, *vide* FitzSimons.

² 15-17 in South West and 20-21 in two Mossamedes, Angola, lizards for whose count I am indebted to Mr. C. M. Bogert.

Coloration. Above, head buff or yellow blotched with brown; body and tail buff, each scale, except for a broad, light, dorsolateral band, so overlaid with black as to be almost obscured except for a light buff or yellow streak, such streaks forming interrupted longitudinal lines; limbs so overlaid as to appear black with light spots. Below, white or yellowish, chin, throat, and limbs sparsely streaked or blotched with russet or vinaceous brown; belly and tail appearing brownish as the white persists only as fine light longitudinal lines along the edges of the ventrals and caudals, on tail sometimes producing an annular effect of alternating brown and yellowish white.

Size. Total length of ♂, 549 (211 + 338) mm., from Paderburn Farm; of ♀, 587 (224 + 362) mm., from Erongo Mountain Plateau (M.C.Z. 43422), exceeded in length from snout to vent only by an Angolan lizard of 250 mm. (Boulenger, 1905c).

Remarks. *G. maltzahni* was based on a young (89 + 135 mm.) individual so that the characters employed for its separation—smooth head, narrow tympanic shield, unicarinate scales—are of only juvenile importance. For details of juvenile coloring, see de Grys' original description. The type locality is just north of Omaruru, Damaraland.

G. v. damarensis was described from an adult (211 + 238 mm.) and two paratypes, and it is hard on Mr. FitzSimons that it is pre-occupied by only a fortnight, for he was the first to invite attention to the distinguishing subspecific characters utilized in my key, after checking them with the material of both races in the Museum of Comparative Zoölogy. I am indebted to Mr. FitzSimons for the date of publication and for information about both type localities, that of *damarensis* being less than a hundred miles northwest of that of *maltzahni*.

Should *schoogi*'s description prove to be misleading and that form not distinguishable from *maltzahni*, then *schoogi* (1916) will have precedence for the western form of *validus*.

Breeding. In September, on Erongo Mountain Plateau, a ♀ (M.C.Z. 43422), held spherical eggs of 12 mm. diameter.

Habits. "Very shy and retiring, usually a single specimen found occupying an isolated outcrop of rocks; never observed on the larger koppies, seemingly preferring the small outcrops." (FitzSimons).

From such they make brief excursions in search of insects, if disturbed while so doing a dash is made for the nearest rocks; should these be more than twenty-five yards away the lizards may be readily captured for they soon tire and seem scarcely able to run the last few yards (Schoeman, in Rose).

Localities. **South West Africa:** Damaraland; Gobabis; Kamanyab; Neu Barmen; Paderburn Farm, Huab River; Roidina Farm, near Omaruru; Windhuk. **Angola:** Bihe to Quilengues; Cubal, Benguela; Mossamedes; Quilengues; Rio Chimba.

Range. South West Africa and Angola.

GERRHOSAURUS MAJOR ZECHI Tornier

1901c. *Gerrhosaurus maior* var. *zechi* Tornier, Arch. Naturg., 67, p. 74, figs. 1-3: Kete Kratje, Togoland.

1919. *Gerrhosaurus zechi* Schmidt, pp. 519, 601, fig. 21, map 16, pl. xx, fig. 2.

East African references to this form have been transferred to *G. m. bottegoi* Prato.

Description. Head moderate, its length being included in the distance from snout to anus 3.9 (young) to 4.8 (adult) times; head shields rugose; rostral in contact with, or separated from, the frontonasal; frontonasal divided; prefrontals broadly in contact or rarely separated; supraoculars 4; supraciliaries 5, rarely 3-4¹; tympanic shield narrow, band-like; body cyclotetragonal or slightly depressed; dorsals strongly keeled, striated or rugose, in 18-20 longitudinal and 32-37 transverse rows; laterals keeled and striated; ventrals in 10 longitudinal and 33 transverse rows from pectoral to anal shields; femoral pores 12-15 on each side; fourth toe with 15 lamellae below; tail about 1.1 to 1.25 times the length of head and body.

Coloration. Above, head buff, each shield heavily overlaid with black; body and tail buff, but every scale on back so heavily overlaid with black that in common with the limbs and tail it presents the appearance of being black spotted with buff, the buff spots forming regular lines but no specially distinct dorsolateral line. Below, chin and throat white; limbs whitish; belly and tail brownish with indistinct fine, light, longitudinal lines along the edges of the ventrals and subcaudals.

Size. Total length of ♂, 455 (203 + 252) mm., of ♀, 302 (129 + 173) mm., both from Garamba. The smaller cotype measured 165 (76 + 89) mm.

Remarks. Known only from the two young cotypes in the Berlin Museum and the three Congo specimens reported on by Schmidt, one of which has been available to me for the present studies. This western

¹ 3, 4, and 5 in the two cotypes, *vide* Tornier.

race is undoubtedly slightly darker than the eastern *bottegoi*. Additional details will be found in both papers cited above.

Dict. Crickets, carabids, and polydesmids (Lang, in Schmidt).

Habits. Lang speaks of "their liveliness and boldness of pose as they watch an intruder." When pursued they rush for their burrows in the hard ground, which burrows, he considers, they themselves dig during the rainy season. Despite the smallness of the aperture they enter with surprising speed, dashing down a passage several feet in length to a spacious chamber about a foot below the surface. He found them difficult to remove for they not only clung to the sides with their strong claws but inflated their bodies. Though very flexible, the heavy tail is discarded when any restraint is put upon it. On being captured they bit and scratched and, when roughly handled, feigned death. "When freed on level ground they have the peculiar habit of running a distance and suddenly halting, sometimes with tail raised, as shown in plate xx, figure 2. This trait, of course, practically protects them from further pursuit when cover has been reached, especially as they remain so quiet that one is likely to tread upon them." (Lang, in Schmidt).

Habitat. Arid savanna.

Localities. **Togo:** Kete Kratje. **Belgian Congo:** Garamba.

Range. Togo to northern Belgian Congo.

GERRHOSAURUS MAJOR BOTTEGOI Prato

- 1895. *Gerrhosaurus Bottegoi* del Prato, Atti Soc. Ital. Sci. Nat., **35**, p. 19, figs. 1-1a: Valley of Ghinda, Eritrea.
- 1910a. Hewitt, p. 62.
- 1930a. Scortecchi, p. 207.
- 1931b. *Gerrhosaurus major* Scortecchi (not Duméril), p. 146.
- 1929h. *Gerrhosaurus major zechi* Loveridge (not Tornier), p. 66.
- 1933h. Loveridge, p. 311.
- 1936h. Loveridge, p. 64.
- 1937f. Loveridge, p. 495.
- 1937d. Mertens, p. 5.

Native name. *Kinhotei* (Sandawi).

Description. Head moderate, its length being included in the distance from snout to anus 4 (young) to 5.2 (adult) times; head shields rugose; rostral rarely in contact with¹, usually separated from², the

¹ Meeting in a point in one (M.C.Z. 30849) only of 23 Mangasini lizards.

² In type by a small azygous scale such as has been described in a *G. m. major* by Tornier (1901c, p. 76).

frontonasal; frontonasal much subject to subdivision though often entire; prefrontals broadly in contact; supraoculars 4; supraciliaries 5, rarely 4 or 6; tympanic shield narrow, band-like; body cyclotetragonal or slightly depressed; dorsals strongly keeled, striated or rugose, in 17-20 longitudinal and 33-36 transverse rows; laterals keeled and striated; ventral in 10 longitudinal and 32-34¹ transverse rows from pectoral to anal shields; femoral pores 10-17 on each side; fourth toe with 13-17 lamellae below; tail about 1.25 to nearly 1.5 times the length of head and body.

Coloration. Above, head buff, each shield flecked with black; body and tail buff, almost every scale heavily streaked with black thus forming regular lines on the whole back so that in common with the flanks, limbs, and tail, it presents the appearance of being brown or black spotted with buff; from back of head to lumbar region a more or less distinct yellowish dorsolateral line. Below, chin and throat white; limbs whitish; belly and tail brownish with fine, light, longitudinal lines along the edges of the ventrals and subcaudals.

Salimu, a native collector who was familiar with these lizards, reported seeing one at Luguo which had a bright red belly; it was dead but the color was not due to putrefaction.

Size. Total length of ♂, 501 (205 + 296) mm., surpassed by a larger unsexed specimen of 545 (225 + 320) mm., both from Mangasini.

Diet. Everyone of 23 Mangasini lizards examined had fed on termites, which happened to be fighting at that time.

Parasites. Tapeworms (*Oochoristica zonuri*) and threadworms (*Physaloptera* sp), present in the Mangasini series.

Habitat. At Dodoma and Mangasini among the piled-up rock masses of the kopjes which are scattered like so many islands among a sea of thorn-bush steppe. As our arrival at Mangasini coincided with the breaking of the rains, and consequently the fighting of termites, the reptiles were probably more in evidence than at other seasons. To shoot them would have shattered their fragile tails, our attempts to capture them merely made us feel foolish, for the creatures retreated under their ledges where they were out of reach, and some of the more gorged individuals then lay and looked at us. I explained the position to the small Wasandawi boys who, with the aid of their dogs and padded arrows, promptly secured a series of thirty in little more than twenty-four hours.

¹ Type stated to have 37, probably due to inclusion of pectorals.

Localities. **Tanganyika Territory:** Dodoma; Lake Eyasi to Usan-su; Luguo (seen, ? race); Mangasini. **Kenya Colony:** (U.S.N.M. 42216). **Italian Somaliland:** Villaggio Duca degli Abruzzi. **Ethiopia:** Bisan River. **Eritrea:** Ghinda Valley.

Range. Central Tanganyika Territory north through western (?) Kenya to Italian Somaliland, Ethiopia and Eritrea.

GERRHOSAURUS MAJOR GRANDIS Boulenger

- 1908b. *Gerrhosaurus grandis* Boulenger, Ann. Natal Mus., 1, pp. 225-233, pl. xxxvi: Zululand.
- 1910b. Boulenger, p. 480.
- 1910a. Hewitt, p. 62.
- 1928. Cott, p. 953.
- 1931. Mann, pp. 389, 397, 399, 401.
- 1937a. Flower, p. 27.
- 1939b. FitzSimons, p. 34.
- 1910c. *Gerrhosaurus major* Hewitt (not Duméril), p. 104.
- 1920a. Loveridge (part), p. 149.
- 1934a. Cott, p. 165.
- 1910c. *Gerrhosaurus major grandis* Hewitt, pp. 102, 105.
- 1935. Lawrence, p. 44.

Description. Head moderate, its length being included in the distance from snout to anus 4 (young) to 4.7 (adult) times; head shields rugose; rostral in contact with, or separated from, the fronto-nasal; prefrontals broadly in contact; supraoculars 4; supraciliaries 5; tympanic shield narrow, band-like; body cyclotetragonal or slightly depressed; dorsals strongly keeled, striated or rugose, in 16-18 (20¹) longitudinal and 32-36 transverse rows; laterals keeled and striated in 10 longitudinal and 30-32 (33¹) transverse rows from pectoral to anal shields; femoral pores 10-13 on each side; fourth toe with 12-14 (15¹) lamellae below; tail 1.3 to 1.5 times the length of head and body.

Coloration. Above, head uniformly buff, body and tail buff with dark brown or black streaks or spots which tend to form regular lines on the back but coalesce posteriorly so that the flanks, limbs, and tail are brown or black spotted with buff; from back of head to lumbar region a more or less distinct yellowish dorsolateral line. Below, chin and throat white; limbs whitish; belly and tail brownish with, or without, fine light, longitudinal lines along the edges of ventrals and subcaudals.

¹ Figures in parenthesis are those of a Morogoro male (A.M.N.H. 13861).

The coloring of iris and pupil is described by Mann (1931).

Size. Total length of largest, 476 (218 + 258) mm., from Birch-enough (FitzSimons), but one might suspect that the tail is regenerated for the type measured 475 (190 + 285) mm.

Remarks. Hewitt (1910a) synonymized *grandis* with *major*, but later (1910c) raised it to varietal rank, or subspecies as now understood.

Breeding. On July 10, at Amatongas, a ♀ held 9 round ova measuring about 6 mm. in diameter (Cott).

Longevity. 7 years, 2 months, 5 days (Flower),

Dict. At Morogoro a captive specimen seized and ate a lizard (*Eremias s. spekii*) which shared its cage.

Parasites. Mites (*Pterygosoma gerrhosauri*) were found by Lawrence.

Habitat. At Morogoro, where this southern race meets with the typical coastal form, these big lizards dwelt among the jumbled rocks which flank the river in its upper reaches. Further south they occur on kopjes and isolated boulder outcrops (FitzSimons).

Localities. **Zululand:** Ubombo. **Transvaal:** Griffin Mine near Leydsdorp; Hectorspruit; Kaapmuiden, Barberton district; Malalane, Barberton district. **Southern Rhodesia:** Birchenough Bridge to Changadzi River. **Northern Rhodesia:** Feira district near Zambezi. **Mozambique:** Amatongas. **Tanganyika Territory:** Morogoro.

Range. Zululand and Transvaal north to east central Tanganyika Territory.

GERRHOSAURUS MAJOR MAJOR Duméril

1851. *Gerrhosaurus Major* A. Duméril, Cat. Méth. Coll. Rept., p. 139: Zanzibar.
1854. Peters, p. 618.
1855. Peters, p. 47.
- 1866b. Peters, p. 888.
- 1869a. Peters, p. 15.
- 1878a. Peters, p. 203.
- 1882a. Peters, p. 58.
- 1887a. Boulenger, p. 121.
1888. Mocquard, p. 118.
1893. Pfeffer, p. 74.
1895. Prato, p. 20, fig. 2.
1896. Tornier, p. 41 (as *maior*).
1897. Tornier, p. 64 (as *maior*).
- 1900b. Tornier, p. 593 (as *maior*).
- 1901c. Tornier, p. 76.
- 1902b. ¹Tornier, p. 582.
- 1907a. Boulenger, p. 8.
- 1910a. Hewitt, p. 62.
- 1910c. Hewitt, pp. 102, 104, 105.
1910. Meek, p. 409.
- 1911b. Hewitt, p. 49.
- 1911a. Sternfeld, p. 247.
- 1911c. Sternfeld, p. 417.
- 1913c. Nieden, p. 79.
- 1920a. Loveridge (part), p. 149.
- 1923d. Loveridge, p. 856.
- 1923h. Loveridge (? part), p. 954.
- 1924b. Loveridge, p. 12.
- 1929h. Loveridge, p. 66.
1889. *Gerrhosaurus zanzibaricus* Pfeffer, Jahrb. Hamburg. Wiss. Anst., 6, p. 7: Zanzibar.
- 1906a. *Gerrhosaurus bergi* Werner, Zool. Anz., 30, p. 54, figs. 1-3: Usambara Mountains, Tanganyika Territory.
- 1910a. Hewitt, p. 62.
1911. Lönnberg, p. 15.
- 1933h. *Gerrhosaurus major major* Loveridge, p. 311.
1934. Pitman, p. 305.
- 1936h. Loveridge, p. 64.
- 1936j. Loveridge, p. 308.
- 1937f. Loveridge, pp. 493, 495.
1941. Moreau & Pakenham, p. 108.

¹ Possibly referable to *G. m. bottegoi*.

Further citations of 'major' will be found under the races *grandis* and *bottegoi*.

Native name. *Guruguru* (Zanzibar: Peters); *guguru* (Kam: Loveridge).

Description. Head moderate, its length being included in the distance from snout to anus 4.1 (young) to 5.1¹ (adult) times; head shields rugose; rostral in contact with, or separated from, the fronto-nasal; frontonasal divided, rarely entire; prefrontals broadly in contact; supraoculars 4, rarely 3; supraciliaries 5, rarely 3-4; tympanic shield narrow, band-like; body cyclotetragonal or slightly depressed; dorsals strongly keeled, striated or rugose, in 17-21² longitudinal and 32-38 transverse rows; laterals keeled and striated; ventrals in 10, rarely 9³ longitudinal and 31-34 transverse rows from pectoral to anal shields; femoral pores 12-14; fourth toe with 13-16 lamellae below; tail 1.25 to 1.5 times the length of head and body.

Coloration. Above, uniform fulvous brown or buff. Below, uniform yellowish white.

Individuals occur, however, even on Zanzibar, which show slight traces of black on the keels and even form ill-defined dark lines on lumbar region and tail. *G. zanzibarius* was based on such a lizard. Mocquard (1888, p. 118) mentions three specimens from Zanzibar of which two had body scales spotted with black. Presumably this was slight, but if not, as part of his collection came from Somaliland the data may be questionable. Tornier (1902c) refers to a young lizard from the Pare Mountains which 'almost certainly had yellow flecks on a dark ground' (translation), I am uncertain, therefore, whether this specimen should be referred to *G. m. bottegoi* or whether it implies that young *major* revert to the ancestral pigmentation in some instances.

Peters (1882a) states that in life the loreal region is rusty red; the lips, auricular border, and lateral folds gray-blue; skin between scales bluish; chin and throat orange yellow; rest of undersurface dirty white.

Size. Total length of ♂, 555 (240 + 315) mm., from Lumbo; total length of ♀, 518 (206 + 312) mm., from Voi.

Remarks. The occipital scale may be present or absent (Pfeffer). Indeed so much variability is displayed by the head shields that no

¹ 5.3 times in type of *bergi*, *sic* Werner (1906).

² 12 given by Meek is an error for 18, *sic* Loveridge (1936h); 22 *sic* Tornier (1901c)

³ 12 in type of *zanzibarius* is almost certainly an error.

useful purpose can be served by repeating them or attempting to enlarge the description to cover them. Some have been noted by Tornier (1901c, pp. 76-81), others by me (1920a, 1929h), and many more will be found in the literature.

Breeding. On April 10, at Voi, a ♀ held a single developing 14 mm. ovum in addition to numerous smaller ova. In the Zanzibar Museum is an egg measuring 75 x 40 mm., together with an emergent lizard of 208 (95 + 113) mm.¹

Dict. Leg of a beetle together with some small beans and grass were found in the stomach of one lizard.

Parasites. Ticks (*Aponomma ochraceum*)², previously known only from a Zanzibar skink (*Mabuya striata*) were plentiful on Zanzibar lizards. Tapeworms (*Oochoristica zonuri*) each about a foot long were removed from a Lumbo lizard, and threadworms (*Physaloptera* sp.) from a Voi specimen.

Habitat. At Voi a female was disturbed while basking in dense scrub whereupon she sought refuge among drifted leaves in a rock fissure. In rock-free, orchard savanna near Kilosa one was seen to emerge from a smoke-filled hollow log around which a bush-fire had been raging for fully five minutes. At Lumbo where termite hills are a feature of the rock-free, dry-bush country, giant greaved lizards dwelt in the passages of the termitaria, on one occasion a lizard was found huddled together with two mongoose (*Helogale ivori*) in the same cavity.

Localities. **Mozambique:** Chifumbazi; Lumbo. **Zanzibar:** Kibweni. **Tanganyika Territory**³ Kilosa (seen); Kipera (seen); Mikindani; Mkindo River (seen); Morogoro (? loc.); Mount Kirui (seen); Mwanza (seen); Pare Pesa, Pare Mtns. (? *bottegoid*); Uhugu (seen); Usambara Mtns. **Kenya Colony:** Ithanga Hills; Lukenya Hills; Maji ya Chumvi; Mazeras; Merelle River; Mt. Mbololo; Mt. Sagalla; Njoro; Sokoki; Takaungu (Takannuga); Teita; Voi; Yatta Plains.

Range. Coastal regions of Mozambique, Tanganyika, and Kenya Colony, also Zanzibar Island.

¹ I am indebted to the curator, Miss E. N. Smith, for these measurements.

² Identification by Prof. J. Bequaert.

³ The Tanga record of Tornier was subsequently corrected to Zanzibar. Some of the sight records may possibly belong to *G. m. bottegoid*.

GERRHOSAURUS TYPICUS (Smith)

1836. *Pleurotuchus typicus* A. Smith, 1837, Mag. Zool. Bot. (Jardine), 1, p. 143: Sandy plains immediately south of mouth of Orange River, South Africa.
1839. *Gerrhosaurus typicus* Duméril & Bibron, p. 383.
1844. Smith, pls. xxxviii, fig. 2, and xlii, figs. 5-8.
- 1887a. Boulenger, p. 123.
1898. Slater, p. 105.
- 1907b. Roux, p. 429.
- 1910b. Boulenger, p. 480.
- 1910a. Hewitt, p. 62.
- 1910c. Hewitt, pp. 103, 105.
- 1910a. Werner, p. 340.
- 1911d. Sternfeld, p. 36.
- 1935a. FitzSimons, p. 544.
1935. Lawrence, p. 44.
- 1937a. FitzSimons, p. 268.
1940. Malan, p. 192, figs.

Native name. Ourukaima-aap (Hottentot: Smith).

Description. Head small, its length being included in the distance from snout to anus 5 to 5.2 (adult) times; head shields smooth; rostral in contact with, or narrowly separated from, the frontonasal; prefrontals slightly separated or barely in contact; supraoculars 4; supraciliaries 5; tympanic shield broad, crescentic; body cyclotetragonal or slightly depressed; dorsals strongly keeled, not striated, in 22-24 longitudinal and 56-58 transverse rows; laterals smooth; ventrals in 10 longitudinal and 30-35 transverse rows from pectoral to anal shields; femoral pores 15-17 on each side; fourth toe with 16-18 lamellae below; tail about 1.25 to 2 times the length of head and body.

Coloration. Above, head, back, and tail deep olive brown; a broad, light yellow, dorsolateral line, dark-edged above, from head to tail anteriorly; flank dark brown with a double series of dark-edged, white (yellow) spots; a similar, but less distinct, series on the tail. Below, creamy white (yellowish); "underside of limbs and distal half of tail carrot-red in adult males." (FitzSimons). Eyes orange brown.

Size. Total length of a cotype, 290 (100 + 190) mm., surpassed by a Klipfontein lizard measuring 320 (140 + 180) mm. (Werner).

Remarks. For discussion on types, see FitzSimons (1937a).

Anatomy. The cranium is discussed by Malan (1940).

Parasites. No mites were found on this species by Lawrence (1935).

Habits. Shy and elusive, venturing abroad only in the early morning

and late afternoon (FitzSimons), when disturbed, darting with great rapidity, they seek refuge in burrows in the sand accumulated about the base of shrubs (Smith).

Localities. **Cape Province:** Namaqualand: Klipfontein; Lekkersing; Soebartsfontein; south of mouth of Orange River; Steinkop.

Range. Little Namaqualand, Cape Province.

GERRHOSAURUS NIGROLINEATUS AURITUS Boettger

- 1887b. *Gerrhosaurus auritus* Boettger, Ber. Senckenb. Ges. Nat., p. 148, pl. v, figs. 3a-3d: Ondonga, Ovamboland, South West Africa.
1893a. Boettger, p. 94.
1910b. Boulenger, p. 480.
1910c. Hewitt, pp. 103, 104, 105.
1911b. Hewitt, p. 50.
1911d. Sternfeld, p. 36, fig. 44.
1920b. Angel, p. 616.
1922a. Mertens, p. 174.
1935b. FitzSimons, p. 363.
1935. Lawrence, p. 44.
1937b. Monard, pp. 77, 78.

Description. Head moderate, its length being included in the distance from snout to anus 4.8 to 5 times (adults); head shields smooth; rostral separated from the frontonasal; prefrontals broadly in contact; supraoculars 4; supraciliaries 4; tympanic shield broad, crescentic; body cyclotetragonal; dorsals strongly keeled but not striated, in 26 longitudinal and 50-57 transverse rows; laterals feebly keeled in young, smooth in adults; ventrals in 8 longitudinal and 32-34 transverse rows from pectoral to anal shields; femoral pores 14-16 on each side; fourth toe with 16-18 lamellae below; tail once and a half to nearly twice the length of head and body.

Coloration. Adult. Above, light sepia brown; head and body flecked and spotted with darker; three or four dark-edged, whitish, dorsolateral lines from head to tail anteriorly; flanks pale with irregular pinkish infusions and spotted with dark sepia; limbs with large, dark-edged, yellowish spots. Below, creamy white.

Young. Above, sepia; vertebral region with three series of white-centered, darker spots of which the median is largest; a narrow, dark-edged, whitish, dorsolateral line from head to tail anteriorly; flanks pale brownish with a series of vertical yellowish white spots (adapted from FitzSimons).

Size. Total length of a Kalahari lizard, 394 (146 + 248) mm., perhaps a composite as lengths are given separately by FitzSimons (1935b) whose paper should be consulted for detailed dimensions, averages, etc.

Remarks. Most of our knowledge of this race is due to FitzSimons, one of whose nine specimens (M.C.Z. 33493) has been available to me.

Diet. Beetles, grasshoppers, termites, and a centipede (*Scolopendra morsitans*) were found in stomachs examined by FitzSimons.

Parasites. Mites (*Pterygosoma bicolor*) found by Lawrence; nematodes by FitzSimons.

Habitat. These were the only members of the genus encountered throughout the Kalahari sand veld by FitzSimons, who considers that they showed a marked preference for those areas where *Terminalia* scrub flourished and beneath whose undergrowth they had their burrows. Owing to their pale color and habit of remaining quiescent until closely approached, they were difficult to detect and capture.

Localities. **South West Africa:** Omondonga (Ondonga), Ovamboland. **Bechuanaland:** Damara Pan; Damara Pan to Okwa River; Gembok; Kalahari; Kaotwe; Kwaai; Mabeleapudi. **Northern Rhodesia:** Lialui (Lealui, *vide* Angel). **Angola:** Lunda (*vide* Monard).

Monard's remarks would make it appear that his record is reliable, his suggestion that this race may be a synonym of *multilineatus* Bocage is definitely rejected. Both Lunda and Lialui (Angel furnishes no remarks which might serve as a check), however, are much further north than one would expect this deserticolous form to have penetrated.

Range. Sand veld areas of South West Africa and Bechuanaland (possibly north to Angola and Northern Rhodesia).

GERRHOSAURUS NIGROLINEATUS NIGROLINEATUS Hallowell

1857. *Gerrhosaurus nigro-lineatus* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, p. 49: Gaboon.
1866a. Bocage, p. 43.
1876a. Peters, p. 118.
1877c. Peters, p. 613.
1887a. Bocage, p. 210.
1887a. Boulenger, p. 122.
1888a. Boettger, p. 25.
1889. Pfeffer, p. 8.
1892. Müller, p. 213.
1892a. Siebenrock, p. 165, pl. ii, figs. 7-7b.
1893a. Boettger, p. 95.
1893. Pfeffer, p. 74.
1893. Prato, p. 9.
1895a. Bocage, p. 35.
1895a. Siebenrock, p. 22.
1896b. Bocage, p. 111.
1896. Tornier, p. 42.
1897b. Mocquard, p. 8.
1897c. Mocquard, p. 123.
1897. Tornier, p. 64.
1898. Tornier, p. 286, fig. 5.
1900b. Boulenger, p. 449.
1900. Ferreira, p. 49.
1902a. Scherer, p. 254.
1902a. Werner, p. 342.
1903a. Ferreira, p. 15.
1904. Ferreira, p. 117.
1905c. Boulenger, p. 111.
1906i. Boulenger, p. 204.
1906a. Mocquard, p. 604.
1907a. Boulenger, p. 8.
1907. Lönnberg, p. 6.
1910b. Boulenger, p. 480.
1911b. Hewitt, p. 49.
1912c. Sternfeld, p. 224.
1919g. Boulenger, p. 16.
1923d. Angel, p. 159.
1923d. Loveridge, p. 856.
1923h. Loveridge (part), p. 955 (omit Frere Town).
1924b. Loveridge, p. 12.
1927d. Witte, p. 328.
1928. Angel, p. 248.
1931. Monard, p. 98.
1931. Power, p. 48.
1933m. Witte, p. 75.
1934. Pitman, p. 305.

- 1937b. Monard, pp. 77, 78.
 1938. Gorham & Ivy, p. 180.
 1866a. *Gerrhosaurus multilineatus* Bocage, Journ. Sci. Lisboa, **1**, p. 44: Duque de Bragança, Angola.
 1866b. Bocage, p. 61.
 1867a. Bocage, p. 221.
 1881d. Peters, p. 147.
 1896. *Gerrhosaurus flavigularis* Tornier (not Wiegmann), p. 42.
 1897. Tornier, p. 64.
 1900b. Tornier, p. 593.
 1902b. Tornier, p. 583.
 1907. Lönnberg, p. 6.
 1909a. Chubb, p. 594.
 1909b. Chubb, p. 35.
 1910. Meek, p. 409.
 1911a. Sternfeld, p. 247.
 1911d. Sternfeld (part), p. 35, fig. 43. (omit Kokong).
 1913c. Nieten (part), p. 80 (omit Teita).
 1915c. Werner, p. 347.
 1917. Sternfeld, p. 428.
 1920a. Loveridge (part), p. 150 (omit Lumbo).
 1923b. Calabresi, p. 157.
 1927c. Power, p. 408.
 1907. *Gerrhosaurus flavigularis forma intermedia* Lönnberg, in Sjöstedt, Wiss. Ergebn. Schwed. Zool. Exped. Kilimandjaro Meru umgeb. Massaiesteppen, No. 4, p. 7, pl. i, figs. 1a-b: Steppe near Lake Natron, Tanganyika Territory.
 1923d. Loveridge, p. 856.
 1924b. Loveridge, p. 12.
 1919. *Gerrhosaurus flavigularis nigrolineatus* Schmidt, p. 523.
 1926a. Mertens, p. 152.
 1933. Schmidt, p. 11.
 1935b. FitzSimons, p. 365.
 1935. Lawrence, p. 44.
 1936h. Loveridge, p. 65.
 1936c. Parker, p. 133.
 1937f. Loveridge, p. 495.
 1937b. Mertens, p. 8.
 1938. FitzSimons, p. 198.
 1938e. Mertens, p. 435.
 1919. *Gerrhosaurus flavigularis flavigularis* Schmidt (part), p. 519.
 1928d. Loveridge, p. 65.
 1929h. Loveridge (part), p. 67 (omit Mazeras, Sagalla, Voi).
 1933h. Loveridge, p. 312.
 1936h. Loveridge, p. 64.
 1937b. Mertens, p. 8.
 1939a. *Gerrhosaurus nigrolineatus australis* FitzSimons, Ann. Transvaal Mus. **20**, p. 10: Kaapmuiden, eastern Transvaal.
 1939b. FitzSimons, p. 35.

Further citations of '*nigrolineatus*' will be found under *f. flavigularis*. Rochebrune's (1884a) is ignored for reasons explained in the introduction.

Native names. *Cangala* or *cangala njambe* (at Catumbela: Bocage); *intyili* (Ngangela: Monard); *rikalanga* (at Cazengo, etc.: Ferreira); *ligondo* (Yao); *liwalawahi* (Makonde at Kitaya); *nangkwakata* (Makonde at Mbanja); *sampula mhangе* or *sangarazi* (Kami).

Description. Head moderate, its length being included in the distance from snout to anus 3.25 (hatchlings) to 5 (adult) times; head shields smooth; rostral separated from, rarely in contact with, the frontonasal; prefrontals usually broadly in contact, sometimes barely, very rarely separated; supraoculars 4; supraciliaries 4, very rarely 3 or 5¹; tympanic shield moderate or broadly crescentic; body cyclo-tetragonal; dorsals strongly keeled, usually striated, sometimes smooth except for keels, in 20-26 (or 28²) longitudinal and 52-60 transverse rows; laterals striated, keeled, or more or less smooth; ventrals in 8 longitudinal and 32-36 transverse rows from pectoral to anal shields; femoral pores 12-21 on each side; fourth toe with 14-18 lamellae below; tail 2.3 to 2.5 times the length of the head and body.

Coloration. Above, head brown or yellowish, uniform or mottled with darker; a dark-edged, white, or pale lemon yellow, dorsolateral line from supraocular region to tail anteriorly; vertebral region olive to brown, usually each scale spotted with darker; rarely a dark-edged, pale, vertebral line, more usually broken up into a series of pale, sometimes dark-edged, dashes or spots, or each dorsal scale streaked with black so as to form a series of dark lines (*multilineatus*); flanks light olive to sandy brown, uniform or flecked with white, yellow, sometimes red, or black, which in the young often form light vertical bars; limbs uniform or with dark-edged, pale spots. Below, uniform yellowish or white.

In life. ♂. Kilosa. Above, nut brown; a vertebral and a pair of dorsolateral lines are yellow edged with black, between these lines are longitudinal series of black spots; sides scarlet with vertical stripes formed by alternating brown and yellow scales. Below, pure white.

Size. Total length of ♂, 467 (170 + 297) mm. from Mangasini, but surpassed by the type of *australis*, also a ♂, 485 (163 + 322) mm.

¹ 3 in an Ndallo Tando lizard (M.C.Z. 7435), 5 in three specimens from Moshi (M.C.Z. 18316), Dar es Salaam (M.C.Z. 18318), and Mbanja (M.C.Z. 47428) respectively.

² In the voluminous literature Schmidt (1919) alone records 28, which Bogert, after examining Schmidt's material, suggests may possibly be due to inclusion of scarcely developed scales on the flanks. See note under *Remarks*.

from Kaapmuiden, Transvaal; Werner's (1910a) record of 475 (140 + 335) mm. from Nitdraai, South West Africa, or Boettger's (1888a) record of 471 (153 + 318) mm. from Povo Nemlao, Belgian Congo.

Remarks. Head shields in this species are subject to considerable variation and the literature is full of discussions regarding them. Schmidt (1919) comments on certain anomalies in his Congo-Angolan material. Parker (1936c) remarks that the frontals are shorter in his Angolan specimens than are those in lizards from South West Africa. FitzSimons (1938) states that the frontonasal was as long as broad in thirteen South West Africa lizards, longer than broad in three others; in the type of *australis* it is broader than long but varies both ways in the paratypes. It is probably an age character. The degree of striation is highly variable though on the whole it may average rather more in western than in eastern specimens.

The number of dorsals across the back has been much discussed. In West Africa they number 24–26, the latter being common, but Schmidt (1919) gives 28 also, by inclusion of scarcely differentiated laterals. In East Africa dorsals range from 20–26 (I have taken several with the latter number at Kitaya within sight of the Indian Ocean) though usually 22–24; north and south of the equatorial belt, however, there is a tendency to reduction so that 20–22 is normal in the highlands of Kenya and northern Tanganyika (*intermedius*) and again in the Transvaal (*australis*). So great is the overlap that I find it impossible to separate an eastern race, much as I should like to do so. Neither can I find—as between eastern and western lizards—any difference in the number of femoral pores, lamellae under fourth toe, or in size (which see).

Nieden's (1913, p. 509) conclusions about head length are vitiated by his method of measuring only to the back of the parietals instead of to behind the tympanum. Under any circumstances the remarks of Tornier, Sternfeld and Nieden, when writing of *flavigularis* or *nigrolincatus* were based on a confusion of both. It was this hopeless state of the literature which led Schmidt, with evident misgivings, to suggest that all eastern and southern lizards should be called *G. f. flavigularis*, a suggestion followed by most of us until FitzSimons straightened the matter out to some extent.

Anatomy. Siebenrock (1892a, 1895a) deals with the cranium and sacrum respectively. More recently Gorham and Ivy (1938) have discussed the function of the gall bladder.

Breeding. There would appear to be a definite season in the coastal region of Tanganyika Territory, for on January 4, at Morogoro, a ♀

held 4 eggs measuring 21 mm. long, while on June 2, at Lindi, the ovules were small.

On March 25, at Kitaya, six eggs were found beneath a pile of rotting vegetation; on opening one egg I found an embryo so small that I placed the remaining five in a tin of damp sand and grass. During the succeeding months the eggs were examined periodically, and one egg which had dried up was discarded. On opening the tin on June 8 I found three lizards so recently emerged that the albumen upon them was still moist. I measured one of them and found it was 181 (56 + 125) mm., but after two years in preservative only 170 (53 + 117) mm.

Since it was collected in March, the remaining egg seemed to have swollen somewhat, it now measured 30 x 22 mm. In anticipation of a long wait I sat down with the egg lying on my palm. Almost immediately, however, there was a convulsive movement and a long slit appeared at one end of the parchment-like shell; about one minute later the little lizard's snout (up to and including the eyes) was thrust out; another minute elapsed and then the rest of the head appeared. For seven minutes thereafter nothing more occurred, then the forepart up to the hind legs crawled out, to be followed, a couple of minutes later, by the long tail. The little creature lay breathing heavily on my hand and offered no objection to being picked up and placed upon the table. Suddenly, with the unexpectedness which characterized most of its actions, and as if a fall of two and a half feet was of no account, it leaped to the ground and raced away with a fine turn of speed. I let it go. The whole emergence had taken place between 10.45 and 11.10 a.m.

On March 17, at Moshi; April 28, at Mbanja; May 8, at Kiponda; May 9, at Nchingidi; June 2, at Lindi; June 20, at Amboni near Tanga; and June 24, at Dar es Salaam, young, within half-a-dozen millimetres of the measurements of the hatchlings mentioned above, were encountered.

Diet. Grasshoppers form the staple food, but termites, beetles, ants, a spider, and even a snail (*Ennea*) have been found in their stomachs. I have taken an adult lizard in a snap-back rat trap baited with meat, but it may be assumed that the lizard had been attracted by insects on the bait. One *nigrolineatus* attempted to take a lizard (*Eremias s. spekii*) away from a larger relative (*Gerrhosaurus m. grandis*) which was engaged in eating it.

Parasites. Mites (*Pterygosoma bicolor*) have been found on this species by Lawrence, and a tick was taken from the throat of a Mangasini lizard.

Enemies. In Tanganyika I have recovered young specimens from the stomachs of a harrier (*Circus macrourus*), hawk (*Kaupifalco monogrammica*) kingfisher (*Halcyon a. orientalis*), house snake (*Boaedon l. lineatus*), wolf snakes (*Lycophidion c. capense*) and an adult, 457 mm. long, from a sand snake (*Psammophis s. sibilans*).

Habitat. In East Africa this shy and elusive lizard lives principally in dry bush country where the sparse grass permits it to dart to its burrow at the first sign of danger. At Kilosa, on several successive days, I observed one of these lizards, a fine male, disappear into a burrow at the base of a bush. It had come to occupy the burrow but recently for I passed the spot four times daily, indeed my attention had been first attracted to the spot by a little heap, or slide, of earth at the entrance, as if the lizard had cleaned the burrow before occupying it. I instructed Salimu to make a snare at the entrance and twice the lizard was caught but wriggled free. The laborious process of digging it out was therefore resorted to and the burrow found to be over a yard in length with two smaller blind alleys opening off it.

In South Africa, according to FitzSimons, the black-lined lizard occupies deserted meerkat burrows in open bush country adjacent to stony kopjes.

Localities. **French Congo:** Cape Lopez; Dongila; Fernand Vaz; Gaboon; Lambarene. **Belgian Congo:** Banana; Boma; Butu-Polo; Ganda-Sundi; Kabala; Kabelwe; Kiambi; Kimuenza; Kinshasa; Kisala; Kunungu; Leopoldville; Moanda; Ngombe; Povo Nemlao; Stanleyville; Zambi. **Cabinda:** Cabinda; Chinchoxo; Landana. **Angola:**¹ Ambriz; Benguela; Bimbi; Cabiri; Caconda; Cahata; Capangombe; Capelongo (Kapelongo); Caquindo (Kakindo); Carangigo; Catengue (? Katenge); Catumbela; Cazengo; Chimpore; Chitau; Congulu; Cubal; Cubango (Kuvangu); Cuma; Dondi—Missao de; Dondo; Duque de Bragança; Galangue (Galanga); Gauca; Hanah; Huilla; Kampulu; Kwito region, affluent of Cubango; Malange; Mulondo; Ndala Tando; Pungo Ndongo; Quilengues; Quindumbo; Quirimbo; Quissange; Rio Dande; Rio Mbale; Santo Amaro; Santo Antonio; Vila de Ponte. **South West Africa:** Gobabis; Kamanyab; Kaokoveld; Nitdraai; Okapehuri Farm near Okasise; Oshikango; Sissekab; Tsumeb (Usumeb); Windhuk. **Bechuanaland Protectorate:** Kabulabula; Kasane; Lobatsi; Serowe. **Orange Free State:** Smithfield. **Transvaal:** Blyde River; Hectorspruit; Kaapmuiden;

¹ In Angolan place names where there is a choice as between the Portuguese 'C' or 'Q' and the French 'K', the former are given preference, similarly single consonants are given preference over double, i.e. Benguela instead of Benguella.

Ottoshoop; Perkoe Farm near Olifants River; Salati. **Southern Rhodesia:** Bulawayo; Changadzi River; Empandeni Hunyanyi River; Victoria Falls. **Northern Rhodesia:** Lavushi Hills; Petauke; Ulungu Mtns. **Tanganyika Territory:** Bagamoyo (seen); Bukoba; Dar es Salaam; Gonya (seen); Handeni (seen); Ikikuyu; Kakoma; Kibonoto; Kidai; Kilosa; Kitaya; Korogwe; Lindi; Makonde Highlands; Mangasini; Marangu; Mbala; Mbanja; Mohoro; Morogoro; Moshi; Mukwese (seen); Nchingidi; Ngare na Nyuki; Pongue in Usegua; Saranda (seen); Tanga; Tendaguru Mtns.; Ukerewe Id. **Kenya Colony:** Fort Hall; Mt. Kenya—near; Nairobi; Wambugu.

Both *G. n. nigrolineatus* (recorded as *australis*) and *G. f. flavigularis* definitely occur together at Changadzi River (FitzSimons), and have been reported to do so at Serowe (Hewitt), and at Ngare na Nyuki (Lönnberg), though the latter, if correct, would be the East African race *fitzsimonsi*. Certainly I found both *n. nigrolineatus* and *f. fitzsimonsi* in the vicinity of Morogoro.

Range. South West Africa north to the French Congo, east to the highlands of central Kenya Colony, south to the Orange Free State.

Folklore. Believed by the Kami of Morogoro to strip bean grass (*majani mbazi*) from its stalk to carry to its hole! In Angola, according to Anchieta (in Bocage), natives consider the bite of this lizard fatal to man and beast!

GERRHOSAURUS FLAVIGULARIS FITZSIMONSI subsp. nov.

- 1862b. *Gerrhosaurus flavigularis* Peters (not Smith), p. 271.
- 1905c. Tornier, p. 381.
- 1905. Neumann, p. 397.
- 1908. Werner, 1907, p. 1847.
- 1913c. Nieden (part), p. 80 (Teita only).
- 1925a. Angel, p. 18.
- 1933. Flower, p. 791.
- 1878a. *Gerrhosaurus flavigularis* var. *ocellata* Peters (not Cocteau), p. 203.
- 1919. *Gerrhosaurus flavigularis flavigularis* Schmidt (not Smith), pp. 519, 601.
- 1923d. Loveridge, p. 856.
- 1924b. Loveridge, p. 12.
- 1929h. Loveridge (part), p. 67 (omit Nairobi, Wambugu, Ottoshoop).
- 1936j. Loveridge, p. 309.
- 1937f. Loveridge, pp. 493, 495.
- 1941. Moreau & Pakenham, p. 108.
- 1923h. *Gerrhosaurus nigrolineatus* Loveridge (part, not Hallowell), p. 955 (Frere Town sight record only).

Native names. Malombo (Teita); nakavara (Pokomo).

Type. Museum of Comparative Zoölogy, No. 41280, an adult ♀ from Mt. Mbololo, Teita, Kenya Colony, collected by Arthur Loveridge, April 19, 1934.

Paratypes. Museum of Comparative Zoölogy, Nos. 13532-3 from Morogoro, Tanganyika Territory (where it occurs with *G. n. nigrolineatus*); No. 17983 from Loita Plains, K. C.; No. 29656 from Mazeras, K. C.; Nos. 29657 and 41275-7 from Voi, K. C.; Nos. 41281-2 from Mt. Mbololo, K. C.; No. 41283 from Ngatana, K. C.; No. 41284 from Golbanti, K. C.

Diagnosis. A rather ill-defined race differing only from typical *flavicularis* from south of the Rovuma River in having the prefrontals usually as broadly in contact as in *G. n. nigrolineatus*, specifically

Prefrontals in contact 81% of 33 specimens examined; range: East Africa from Sennar south to the Rovuma River, southern frontier of Tanganyika Territory.....*f. fitzsimonsi*

Prefrontals separated in 60% of 88 specimens¹; range: Mozambique south to Natal and western Cape Province...*f. flavicularis*

This race should not be confused with *G. f. intermedia* Lönnberg (1907) which, from his figure, is a synonym of the long-headed *G. n. nigrolineatus* Hallowell.

Description. Head small, its length being included in the distance from snout to anus 4.75 (young) to 6 (adult) times; head shields smooth, not striated; rostral separated from the frontonasal; prefrontals broadly in contact, or separated²; supraoculars 4; supraciliaries 5, rarely 6³; tympanic shield narrow, band-like; body cyclo-tetragonal; dorsals strongly keeled, striated, in 20-22 longitudinal and 59-61 transverse rows; laterals striated and keeled, rarely almost smooth; ventrals in 8 longitudinal and 34-36 transverse rows from pectoral to anal shields; femoral pores 13-15 on each side; fourth toe with 17-19 lamellae below; tail from 2.25 to 2.5 times the length of head and body.

Coloration. Essentially similar to that of the typical form.

Size. Total length of largest known, 494 (144 + 350) mm. from Mazeras; total length of type ♀, 475 (142 + 333) mm., from Mt. Mbololo.

¹ Based on 11 specimens in the Museum of Comparative Zoölogy together with the data of 77 others published by FitzSimons (1935b, Ann. Transvaal Mus. 16, p. 365) after whom I take pleasure in naming the new form.

² In one Mazeras (U.S.N.M. 49148), two Voi (U.M.M.Z. 78850), and two Morogoro (U.M.M.Z. 61142-3) out of a total of 33 examined.

³ On one side of a Voi lizard (M.C.Z. 41277) only.

Remarks. The above description of this rather ill-defined race is based solely on the type and paratype series of thirty-three lizards.

Breeding. Between April 7 and 19, at Voi and on Mt. Mbololo, numerous females were gravid; three lizards each held 4 eggs which measured approximately 21 x 11 mm., 24 x 11 mm., and 27 x 15 mm., the latter apparently ready for deposition.

Diet. Grasshoppers, locusts, crickets, cockroaches, and the scales of a large *Gerrhosaurus*, presumably part of the slough of the lizard in whose stomach they were found (Loveridge, 1936j).

Habits. Extremely wary and active so that one rarely catches more than a glimpse of the snake-like tail as its elongated owner makes a dash for its burrow at the base of some bush.

Habitat. The semi-arid thornbush country of the coast and uplands.

Localities. **Anglo-Egyptian Sudan:** Hedeabat on Blue Nile. **Ethiopia:** Abulcassim camp; Harar. **Kenya Colony:** Bura; Frere Town (seen); Golbanti; Loita Plains; Mazeras; Mt. Mbololo; Ngatana; Sagalla; Sokoki; Teita; Voi. **Tanganyika Territory:** (? Langenburg); Mkuyuni; Mnazi; Morogoro. **Zanzibar?**

Range. Central Tanganyika Territory north through Kenya and Ethiopia to Sennar in eastern Anglo-Egyptian Sudan.

GERRHOSAURUS FLAVIGULARIS FLAVIGULARIS Wiegmann

- 1828. *Gerrhosaurus flavigularis* Wiegmann, Isis von Oken, col. 378: "Africa merid. Krebs."
- 1830. Wagler, p. 158.
- 1833. Wagler, pl. xxxiv, fig. 1.
- 1839. Duméril & Bibron, p. 378.
- 1844. Smith, A., pl. xxxvii; pl. xlii, figs. 1-4.
- 1845. Gray, p. 50.
- 1854. Peters, p. 618.
- 1855. Peters, p. 47.
- 1882a. Peters, p. 57.
- 1887a. Boulenger, p. 122.
- 1889. Boettger, p. 288. (*flavogularis*)
- 1891a. Matschie, p. 605.
- 1892a. Boulenger, p. 174.
- 1893a. Boettger, p. 95.
- 1893. Pfeffer, p. 74.
- 1894a. Günther, 1893, p. 618.
- 1896a. Bocage, p. 88.
- 1897e. Boulenger, p. 800.
- 1898. Johnston, p. 361.
- 1898. Schlater, p. 105.
- 1901. Gadow, p. 559.
- 1902b. Boulenger, p. 17.

- 1905a. Beddard, p. 61, fig. 17.
 1905b. Beddard, p. 256, figs. 33-38.
 1907a. Boulenger, p. 8.
 1907b. Roux, p. 429.
 1908b. Boulenger, p. 226.
 1910b. Boulenger, p. 480.
 1910a. Hewitt, pp. 56, 57, 62, 66, 67.
 1910c. Hewitt, pp. 103, 105.
 1910a. Werner, p. 341.
 1911d. Sternfeld (part), p. 35 (Kokong only).
 1913. Hewitt & Power, p. 157.
 1913a. Werner, in Brehm, p. 191, fig. -
 1920b. Angel, p. 616.
 1920. Hewitt, p. 91.
 1920a. Loveridge (part), p. 150.
 1928. Cott, p. 953.
 1928a. Essex, 1927, p. 933.
 1929. Rose, p. 120, figs. 78-79.
 1931. Power, pp. 42, 48.
 1935. Power, p. 333.
 1935. Lawrence, p. 44.
 1937a. Flower, p. 27.
 1937e. Hewitt, p. 43, pls. xi, xxvii.
 1940. Malan, p. 192, figs.
 1833. *Gerrhosaurus Ocellatus* Cocteau, Mag. Zool. Guer., cl. iii, pl. iv, pl. vi, fig. 1: Cape of Good Hope.
 1836. *Pleurotuchus Desjardini* A. Smith, Mag. Zool. Bot. (Jardine), 1, p. 143: Southeast coast of South Africa.
 1836. *Pleurotuchus chrysobronchus* A. Smith, Mag. Zool. Bot. (Jardine), 1, p. 144: Near sources of Cowie River about Grahamstown and Blue Kranz, South Africa.
 1844. *Gerrhosaurus bibroni* A. Smith, Illus. Zool. S. Africa, Rept., pl. xxxviii, fig. 1, pl. xlii, figs. 9-12: Near sources of Caledon River, Quathlamba Mountains, Orange Free State.
 1845. Gray, p. 50.
 1851. Duméril, A., p. 141.
 1883b. *Gerrhosaurus flavigularis* var. *quadrilineata* Boettger, Ber. Offenbacher Ver. Natur., Nos. 22-23, p. 156: Smithfield, Orange Free State, Union of South Africa.
 1922a. Mertens, p. 174.
 1896c. *Gerrhosaurus nigrolineatus* Bocage (not Hallowell), p. 118.
 1898. Werner, 1896-7, p. 142.
 1919. *Gerrhosaurus flavigularis flavigularis* Schmidt (part), p. 519.
 1934a. Cott, p. 164.
 1934. Pitman, p. 305.
 1935b. FitzSimons, p. 365.
 1937a. FitzSimons, p. 272.
 1939b. FitzSimons, p. 34.

Native name. *Zumondua* (Sena: Cott).

Description. Head small, its length being included in the distance from snout to anus 4.8 (young) to 6.6¹ (adult) times; head shields smooth or faintly striated; rostral separated from the frontonasal; prefrontals separated or sometimes² in contact; supraoculars 4; supraciliaries 5, rarely 6³; tympanic shield narrow, band-like; body cyclotetragonal; dorsals feebly or strongly keeled, striated, in 20–24⁴ longitudinal and 55⁵–67 transverse rows; laterals keeled and striated in young, smooth in adults, in 8⁶ longitudinal and 32–38 transverse rows from pectoral to anal shields; femoral pores 10–16 on each side; fourth toe with 17–21 lamellae below; tail 1.5 (young) to 2.1 (adult) times the length of head and body.

Coloration. Above, head olive brown or yellowish, uniform or mottled with darker (in young sides of head bright yellow with two vertical black bars in temporal region); a dark-edged, white, greenish, or pale lemon yellow (in young bright yellow), dorsolateral line from supraocular region to tail anteriorly; vertebral region olive to chocolate brown, uniform, or with a pair of fine, dark-edged, pale lines, more usually broken up into a series of black-edged, pale dashes or squarish spots with white central shaft; flanks light olive to sandy brown, uniform or flecked with white, yellow, dull red (adults), dark brown, or black (in young forming black-bordered, greenish, or bright yellow vertical bars); limbs uniform or with black-edged, pale (in young greenish or bright yellow) spots. Below, throat white or yellow, rest of undersurface uniform creamy white or yellowish.

The contrasting coloration of adult and young in Mozambique are described by Cott (1934a.). Drury, in Hewitt (1937e) records a lizard from Bushman River as having its snout tinged with red, upper lips scarlet, throat scarlet superimposed on yellow.

Size. Total length of ♀, 378 (121 + 257) mm. from Vumba Mtn. (M.C.Z. 44423), but surpassed in length of head and body by another ♀ of 130 mm. from Umvoti River (M.C.Z. 44063).

Remarks. Wagler (1828–33) gives supraciliaries 4, supraorbitals 5, an obvious switch in designation of these scales as at present under-

¹ 18.4 times, *vide* FitzSimons (1935b).

² FitzSimons (1935b) with 77 specimens, found it widely separated in 20, separated by an azygous shield in 2, narrowly separated in 19, narrowly in contact in 8, in fair contact in 23.

³ On one side of a Pretoria specimen (M.C.Z. 14237) and one side of a Port Alfred lizard (U.M.M.Z. 61487).

⁴ 20–28 in Hewitt (1910c) is presumably a misprint.

⁵ 55 *vide* Boulenger (1887a), my lowest is 58 (U.M.M.Z. 61487).

⁶ 10 recorded by Sir A. Smith (1844) is undoubtedly a slip.

stood. Recently the type of *bibroni* has been reëxamined by Fitz-Simons (1937a).

Anatomy. Various anatomical features, particularly the brain, have been dealt with by Beddard (1905a, 1905b), and the so-called branchial arch by Hewitt (1920).

Breeding. On February 15, at Caia, a captive ♀ laid 6 eggs measuring 22.5 x 14 mm. (Cott), such an egg, about 19 x 13 mm., has been figured by Hewitt (1937e, pl. xxxvii, fig. 1).

Longevity. 11 years, 3 months, 21 days (Flower).

Diet. A mantid, five grasshoppers, and three ants, in four lizards examined by Cott (1934a); crickets, beetles and millipedes (Essex); in captivity, besides insects, scraps of meat and such unexpected items as pieces of banana and watermelon (Rose).

Parasites. Mites (*Pterygosoma bicolor* and *P. hystrix*) were found by Lawrence.

Defence. Struggles violently and bites freely, while if the tail is seized it is immediately discarded.

Temperament. Essex's (1928) charge of intractability is refuted by Rose (1929) who states that, though attempting to bite when first captured, if gently handled these yellow-throated lizards become exceptionally docile and tractable; some which were kept on a rockery docilely submitted to recapture and would lie placidly on one's hand without sign of fear or attempt at escape. They soon learned to take food from the hand.

Hibernation. They hibernate at Gleniffer according to Ranger, in Hewitt (1937e).

Habitat. This shy lizard dwells in a hole or burrow usually excavated beneath a bush, which may be in a wide variety of situations from the sea shore and sandy bush country of the coast to grassy flats and rocky ravines on mountain slopes. Smith's (1836) original statement regarding damp situations seems to have been purely fortuitous. In the Kalahari it is to be found on the rocky outcrops and kopjes of the eastern fringe, according to FitzSimons, who also states that it does not occur in the southwest part of Cape Province (1935b, p. 365) which is not borne out by Hewitt (1910a, p. 62) or Rose (1929, p. 120) for the latter says that it occurs, though rarely, on the Peninsula.

Localities. **Cape Province:** Bath's Hill near Grahamstown; Blaauwkrantz; Cape Town; Cowie River sources; East London; Gleniffer; Grahamstown; Hermanus; Kalk Bay; Knysna; near Kowie River, Pondoland; Port Alfred; Port Elizabeth; Port St. Johns; Robertson; Rondebosch; Schoenmaker's Kop, Port Elizabeth; Transkei. **Natal:**

Durban; Lobatsi; Lower Illovo River; Pietermaritzburg; Umvoti River. **Basutoland. Orange Free State:** Caledon River sources in Drakensberg (= Quathalamba) Mts.; Smithfield. **Zululand:** Mseleni. **Transvaal:** Botsabelo near Middleburg; Johannesburg; Linokana; Mphome, Zoutpansberg district; Pretoria. **Bechuanaland:** Gabani; Gaberones; Kalahari; Kokong to Kong; Molepole; Serowe; Shoshong; Taungs. **Southern Rhodesia:** Changadzi River; Mazoe; Salisbury district; Vumba Mtn. **Northern Rhodesia:** Luangwa River. **Nyasaland:** Fort Hill, Masuku district; Nkata Bay to Ruarwe; Nyika Plateau; Shire Highlands. **Mozambique:** Amatongas; Caia; Charre; Lumbo; Quilimane; Tete.

Range. Western Cape Province east to Natal, north to Mozambique, Nyasaland, and Northern Rhodesia.

Genus CORDYLOSAURUS

1845. *Pleurostichus* Gray (part), Cat. Lizards Brit. Mus., p. 51 (type: *Scincus sepiiformis* Schneider).
 1865a. *Cordylus* Gray, Proc. Zool. Soc. London, p. 641 (type: *trivirgatus* Gray = *trivittatus* Peters).

Tongue nearly entirely covered with imbricate scale-like papillae; nostril pierced between 2 nasals and first labial; no prefrontals; frontoparietals present (in young) or absent (in adults); lower eyelid with a transparent disk; dorsal and ventral scales forming straight longitudinal and transverse series; a strong lateral fold; limbs well developed; subdigital scales keeled; femoral pores present.

Range. Southwest Africa (Western Cape Province north to Angola).

CORDYLOSAURUS SUBTESSELLATUS (Smith)

1844. *Gerrhosaurus subtessellatus* A. Smith, Illus. Zool. S. Africa, Rept., pl. xli, fig. 2; Great Namaqualand, South West Africa.
 1844. *Gerrhosaurus tessellatus* A. Smith, pl. xlii, figs. 17-20 (error for *subtessellatus*).
 1845. *Pleurostichus subtessellatus* Gray, p. 51.
 1862a. *Gerrhosaurus trivittatus* Peters, Monatsb. Akad. Wiss. Berlin, p. 18: Neu Barmen, South West Africa.
 1869b. Peters, p. 659.
 1865a. *Cordylus subtessellatus* Gray, p. 641.
 1887a. Boulenger, p. 126.
 1898. Slater, p. 105.
 1910b. Boulenger, p. 482.
 1910c. Hewitt, pp. 103, 105, 106.

- 1911d. Sternfeld, p. 37 (misspelled)
- 1935. Lawrence, p. 44.
- 1937a. FitzSimons, p. 269.
- 1865a. *Cordylosaurus trivirgatus* Gray, Proc. Zool. Soc. London, p. 641, pl. xxxviii, fig. 2: Damaraland, South West Africa.
- 1867a. Bocage, p. 222.
- 1865b. *Cordylosaurus trivittatus* Gray, p. 148.
- 1887a. Boulenger, p. 126.
- 1888b. Fischer, p. 12.
- 1895a. Bocage, p. 37.
- 1898. Slater, p. 105.
- 1910a. Werner, p. 341.
- 1910b. Boulenger, p. 482.
- 1910a. Hewitt, p. 62.
- 1910c. Hewitt, pp. 103, 105, 106.
- 1911. Lampe, p. 173.
- 1911b. Sternfeld, p. 406.
- 1911d. Sternfeld, p. 36, fig. 45.
- 1914b. Methuen & Hewitt, p. 140.
- 1915c. Werner, p. 347.
- 1935. Lawrence, p. 44.
- 1936c. Parker, p. 132.
- 1937b. Mertens, p. 8.
- 1937b. Monard, p. 77.
- 1938. FitzSimons, p. 199.
- 1910a. *Cordylosaurus tessellata* Hewitt, p. 62.
- 1932. *Cordylosaurus trivittatus australis* Hewitt, Ann. Natal Mus., **3**, p. 114, pl. vi, fig. 5: Between Garies and Kamiesberg, Namaqualand, Cape Province.
- 1935. Lawrence, p. 44.

Native name. *Humbokumbo* (at Dombe: Anchieta).

Description. Head and body depressed. Rostral separated from the frontonasal; no prefrontals; supraoculars 4; supraciliaries 4; frontoparietals, interparietal, and parietal separate and distinct in young, fused into a single shield in adults; tympanic shield narrower or broader than the posterior upper temporal; dorsals distinctly keeled (or nearly smooth, see *Remarks* below), tri- or quinquecarinate or those in lumbar region with a median keel, in 15 longitudinal and 52-55 transverse rows; ventrals in 8 longitudinal rows; femoral pores 7-10 on each side, the distal ones less developed in females; tail about 2 to 2.7 times the length of head and body.

Coloration. Above, dark brown or black; a pale olive, pale buff, or yellowish, dorsolateral line, never more than two scales in width

on body, commencing on head becomes pinkish buff or pale greenish blue posteriorly changing to bluish green or bright blue on tail; limbs tinged with pink; feet, or at least the digits, reddish. Below, chin pinkish buff; chest and belly whitish; limbs reddish.

The above description refers to "*trivittatus*", that for *subtessellatus* was described in great detail by Smith in the letterpress accompanying pl. xli. Boulenger (1887a), however, has condensed it as follows: Above, middle of back yellow brown, dorsolateral region chequered white and blackish; sides dark brown. Below, brownish.

Size. Total length of type, 151 (50 + 101) mm. (Boulenger). The largest "*trivittatus*" recorded was 121 (44 + 77) mm. Parker's (1936c) statement that his largest ♀ measures "only 143 mm. from snout to vent" may be assumed to be a misprint for 43 mm., or for total length.

Remarks. For a century *subtessellatus* has been known only from the description and two cotypes, of which one, preserved in the British Museum, has been checked with the original description by FitzSimons (1937a). The dorsals were stated to be "quite smooth" and "destitute of even the rudiments of a keel" (Smith) and by Boulenger as "nearly smooth." As this cotype is so much larger than any other known specimen, it seemed reasonable to suppose that its smooth condition might be attributable to age. A second specimen, without locality, is in the South African Museum, one wonders if it can be the missing cotype. It was seen by Methuen and Hewitt (1914b) at which time they thought it was but a color variant of *trivittatus*; they saw, but failed to catch, a lizard which seemed to them to be a *subtessellatus*. As Mr. V. FitzSimons is probably the only living herpetologist who has examined both the known specimens, I appealed to him for an opinion as I doubted the distinctness of the two forms which are generally separated as follows:

Dorsal shields nearly smooth *subtessellatus*

Dorsal shields keeled, even though feebly *trivittatus*

He replied (1942): "I am inclined to regard *Cordylosaurus subtessellatus* and *trivittatus* as synonymous; the cotype in S.A.M. is in such bad condition that it cannot be differentiated from *trivittatus*."

Hewitt (1932) described *australis* on the basis of two specimens in which the interparietal and parietal were fused and the pale dorso-lateral lines narrower, *i.e.* less than two scales broad, not encroaching on a third scale, than in the only South West African example of *trivittatus* which he had for comparison. Parker (1936c) with twelve S. W. African specimens found them to cover all the variations listed by Hewitt as distinguishing *australis* with the exception of the keeling

of the scales, which, in *australis*, were said to lack the strong central keel of *trivittatus* though well keeled in the lumbar region. Parker points out that the condition of the parietals is an age character, a view corroborated by FitzSimons (1938) who found the tympanic shield in his series much narrower than the posterior upper temporal, whereas Parker had found it always broader.

Sexual dimorphism. Hewitt (1932) states that the dorsal scales from head to shoulders are multicarinate in a ♂ and smooth in a ♀ which were taken between Garies and Kamiesberg.

Habits. This lizard is very active, the lateral undulations which it employs when moving fast remind one of those of a snake, according to Jordan (in Parker, 1936c); the tail is readily discarded.

Habitat. Both cotypes were captured by Sir A. Smith personally, being taken among short grass in the vicinity of a low rocky knoll. FitzSimons found them beneath stones on a sandy, open hillside, and one in a hole at the foot of a mopane tree.

Localities. **Cape Province:** Calvinia Division; Clanwilliam Division; De Aar; Garies to Kamiesberg (*australis*); Kakamas; Klaver; Little Namaqualand; Steinkop. **South West Africa:** Aus to Bethanien; Churutabis; Damaraland; Gobabis; Great Namaqualand (*subtesselatus*); Hereroland; Hoffnung; Kalkveld; Karibib; Kraikluft; Great Karas Mtns.; Kuibis; Narudas Süd; Neu Barmen; Okahandja; Okaukuejo to Outgo; Rietmond; Tsumeb (Usumeb); Voigtsgrund; Windhuk. **Angola:** Benguela; Catumbela; Dombe; Rio Coroca.

Range. Cape Province north through South West Africa to Angola.

Folklore. Methuen (1914b) relates how he was offered a sovereign for one of these lizards by a Bastaard Hottentot, who, though regarding it as poisonous (to eat?), considered it a valuable antidote for snakebite.

Genus TETRADACTYLUS

- 1802d. *Chalcides* Daudin (part, not of Laurenti, 1768), Hist. Nat. Rept., 4, p. 359.
- 1820. *Tetradactylus* Merrem (not Duméril & Bibron, M. S. Paris Mus.) Vers. Syst. Amph., pp. 13, 75 (type: *tetradactylus* Daudin).
- 1825. *Cicigna* Gray, Ann. Philos. (2), 10, p. 201 (type: *Scincus sepiformis* Schneider).
- 1826. *Saurophis* Fitzinger, Neue Classif. Rept., p. 20 (type: *Lacerta seps* Linnaeus).
- 1838. *Caita* Gray, Ann. Nat. Hist., 1, p. 389 (type: *africana* Gray).

For further synonymy see Boulenger, 1887a, Cat. Lizards Brit. Mus., 3, p. 124.

Tongue covered with oblique plicae converging anteriorly towards the median line; nostril pierced between 2 (rarely 3) nasals and first labial, or latter rarely excluded; no prefrontals; frontoparietals present; lower eyelid scaly; dorsal and ventral scales forming straight longitudinal and transverse series; a strong lateral fold; fore limbs present or absent; digits, if present, smooth inferiorly; femoral pores present or absent.

The members of this genus present an interesting series of stages between the four-footed *Gerrhosaurus* and the serpentiform *Paratetradactylus*.

Range. Union of South Africa; Angola; Belgian Congo.

SYNOPSIS OF VARIATION IN THE GENERA TETRADACTYLUS & PARATETRADACTYLUS

Species	Digits on Fore limb	Digits on Hind limb	Dorsal rows longitudinally	Dorsal rows transversely	Ventral rows longitudinally	Femoral pores	Max. length of head and body	Max. length of tail	Range
<i>s. seps</i>	5	5	13	57-61	8	8-12	59	132	W. Cape Prov.
<i>s. laericauda</i>	5	5	13	62	8	7	63	122	E. Cape Prov.
<i>t. tetradactylus</i>	4	4	14	61-64	6	4-5	70	214	W. Cape Prov.
<i>t. bilineatus</i>	4	4	14	63	6	4-5	63	-	E. Cape Prov.
<i>eastwoodae</i>	3	2	12	67	6	3	64	126	Transvaal
<i>breyeri</i>	2	1	12	70	8!	2	56	106	Transvaal
<i>africanus</i>	1	1	14	69-70 ¹	6	2-3	72	250	Natal: Zulul.
<i>f. fitzsimonsi</i>	0	1	14	69-70	6	2-3	78	237	Cape Provin.
<i>f. boulengeri</i>	0	1	12	64	6	0	66	200	Congo Belge
(<i>lundensis</i>)	0	1	12	-	6	0	53	195	Angola
<i>P. ellenbergeri</i>	0	1	14	65	6	0	64	216	N. Rhodesia

¹ 60-62 *vide* Boulenger, but doubted by Hewitt.

Key to the Species

1. Ventrals in 8¹ rows across belly; dorsals in 13 rows across back; limbs short but pentadactyle 2
 Ventrals in 6¹ rows across belly; dorsals in 12 or 14 rows across back; limbs, if present, not pentadactyle 3
2. Head shields striated or slightly rugose; caudals keeled; femoral pores 8-12; range: Western Cape Province *s. seps*
 (p. 526)
 Head shields smooth; caudals mostly smooth; femoral pores 7; range: Eastern Cape Province and Natal *s. lacricauda*
 (p. 527)
3. Limbs tetradactyle 4
 Limbs, if present, with three toes or less 5
4. Nostril bordered by 2 scales and a labial; third finger subequal to, or but slightly longer than, the second; range: Western Cape Province
t. tetradactylus (p. 528)
 Nostril bordered by 3 scales but no labial; third finger considerably longer than second; range: Eastern Cape Province *t. bilineatus*²
 (p. 529)
5. Hind limb with 2 clawed digits, fore limb with 3; range: Transvaal
eastwoodae (p. 530)
 Hind limb undivided, fore limb, if present, with not more than 2 clawed digits 6
6. Fore limb present 7
 Fore limb absent 8
7. Fore limb with 2 clawed digits; ventrals *said to be* in 8 rows across belly; range: Transvaal *breyeri*
 (p. 530)
 Fore limb undivided; range Natal and Zululand *africanus*
 (p. 531)
8. Preanal pores 2-3; dorsals in 14¹ longitudinal and 69-70 transverse rows from parietal to base of tail; range: Cape Province *f. fitzsimonsi*
 (p. 532)
 Preanal pores 0-0; dorsals in 12 longitudinal and 64 transverse rows from parietals to base of tail; range: Eastern Angola and southern Belgian Congo *f. boulengeri*
 (p. 533)

¹ Said to be 8 in *breyeri* also.² A somewhat doubtful race.

TETRADACTYLUS SEPS SEPS (Linnaeus)

1758. *Lacerta Seps* Linnaeus, Syst. Nat., ed. 10, 1, p. 204: "In Meridionalibus."
 1760. Linnaeus, p. 363.
 1801. *Sincus (sic) sepiiformis* Schneider, Hist. Amphib., 2, pp. 171, 191: No locality.
 1820. *Tachydromus seps* Merrem, p. 69.
 1825. *Cicigna sepiiformis* Gray, p. 201.
 1839. *Gerrhosaurus sepiiformis* Duméril & Bibron, p. 384.
 1844. A Smith, pl. xli, fig. 1, pl. xlii, figs. 13-16.
 1851. Gravenhorst, p. 301, pl. xxvii, figs. 1-7.
 1845. *Pleurostrichus sepiiformis* Gray, p. 51.
 1887a. *Tetradactylus seps* Boulenger, p. 124.
 1887b. Boettger, p. 149.
 1890b. Müller, p. 701.
 1898. Werner (1896-7), p. 142.
 1898. Slater, p. 105.
 1901. Gadow, p. 559.
 1907b. Roux, p. 429.
 1910b. Boulenger, p. 481.
 1910a. Hewitt, p. 62.
 1910c. Hewitt, pp. 103, 105.
 1913. Hewitt & Power, p. 157.
 1926b. Rose, p. 493.
 1927b. Hewitt, p. 454.
 1928a. Essex, 1927, p. 933.
 1929. Rose, p. 124, fig. 81.
 1935. Lawrence, p. 44.

Description. Habit elongate; limbs pentadactyle, short, the length of the hind limb equals or exceeds the distance from snout to fore limb; tail about 1.5 to 2.2 times the length of head and body.

Head shields striated or slightly rugose; dorsals strongly striated, the posterior, as also the upper caudals, with a strong median keel, in 13 longitudinal and 57-61 transverse rows; ventrals in 8 longitudinal rows; femoral pores 8-12 on each side.

Coloration. Above, olive, olive bronze, or reddish brown; upper lip with small, yellow, dark-edged spots; edges of the scales darker; sides usually darker. Below, gray or iridescent olive.

Size. Total length of largest, 191 (59 + 132) mm. (Boulenger).

Habits. A common species on grass-grown mountain slopes where, though in slow movements progressing by use of its limbs alone, its slender form plays a major part in the rapid undulations which assist its departure. In such serpentine movements the feet do not appear

to be employed (Rose). Retires beneath stones (Essex). Occurs up to 6000 feet.

Localities. **Cape Province**, western: Cape Flats; Cape Peninsula; Cape Town; Kalk Bay; Knysna; Paarl Division; Robben Island; Somerset Strand; Table Mountain.

Range. Western Cape Province.

TETRADACTYLUS SEPS LAEVICAUDA Hewitt

1915. *Tetradactylus laevicauda* Hewitt, Ann. Transvaal Mus., **5**, p. 101: Tabamhlope, Natal.
1927b. Hewitt, p. 454.
1928a. Essex, 1927, p. 933.
1935. Lawrence, p. 44.
1937e. Hewitt, p. 44, pl. xiv.

Description. Habit elongate; limbs pentadactyle, short, the length of the hind limb exceeds the distance from snout to fore limb; tail about 2 times the length of head and body.

Head shields quite smooth; dorsals fairly strongly striated, the posterior, as also the upper caudals, without a median keel, in 13 longitudinal and 62 transverse rows; ventrals in 8 longitudinal rows; femoral pores 7 on each side.

Coloration. Above, olive; upper lip and sides of neck with small pale spots; a pale dorsolateral line, commencing at nostril, broadens at midbody, and terminates on tail anteriorly; sides and limbs brownish black, some black and pale spots on the former anteriorly. Below, pale, olive green to bluish- or grayish-green; tail pale olive brown.

Size. Total length of type, $185 + (63 + 122 +)$ mm., tail incomplete.

Remarks. Essex appears to be mistaken in supposing that the tail length of *laevicauda* is proportionately longer than that of typical *seps* with tail intact. The above description is taken almost entirely from that of the original holotype (T. M. 2524) which may be consulted for minor details.

Localities. **Natal:** Tabamhlope. **Cape Province**, eastern: Drakensberg; Hogsback, Amatola Mtns.; Katberg.

Range. Eastern Cape Province to Natal.

TETRADACTYLUS TETRADACTYLUS TETRADACTYLUS (Daudin)

- 1802d. *Chalcides tetradactylus* Daudin, Hist. Nat. Rept., 4, p. 362: No locality.
 1803. Lézard tétradactyle Lacépède, Ann. Mus. Nat. Hist. Nat., 2, p. 357,
 pl. lix, fig. 2: says type donated by Dutch Republic.
 1820. *Tetradactylus chalcidicus* Merrem, Vers. Syst. Amphib., pp. 13 and 75:
 No locality.
 1822. *Seps tetradactylus* Schinz, p. 90.
 1826. *Saurophis seps* Fitzinger (not Linné), p. 50.
 1849. Smith, A., p. 9.
 1829–1844. *Chalcis tetradactyla* Guérin, pl. xvi, fig. 2.
 1830. *Saurophis tetradactylus* Wagler, p. 159.
 1845. Gray, p. 51.
 1839. *Saurophis Lacapedii* Duméril & Bibron, Erpét. Gén., 5, p. 389: South
 Africa.
 1851. Gravenhorst, p. 304, pl. xxvii.
 1887a. *Tetradactylus tetradactylus* Boulenger, p. 125.
 1898. Selater, p. 105.
 1910b. Boulenger, p. 481.
 1910a. Hewitt, p. 62.
 1910c. Hewitt, pp. 103, 106.
 1916. Andersson, p. 39.
 1926b. Rose, p. 493.
 1927b. Hewitt, p. 454.
 1928a. Essex, 1927, p. 933.
 1929. Rose, p. 125.
 1935. Lawrence, p. 44.
 1896c. *Caita tetradactyla* Bocage, p. 118 (see remarks under localities).

Description. Habit serpentiform; limbs tetradactyle, very short, the hind limb extending back to the sixth or seventh¹ or tenth² row of caudals; tail about 3.3 times the length of head and body.

Head shields smooth; dorsals strongly striated, keeled, in 14 longitudinal and 61–62 transverse rows; ventrals keeled, in 6 longitudinal rows; femoral pores 4–5 on each side.

Coloration. Above, olive brown; head spotted with dark brown; temple and sides of neck usually with dark brown vertical bars; a dark brown dorsolateral line separated from its fellow by 2 scales, the inner halves of the two median dorsal scales being without pigment. Below, pale olive.

¹ *vide* Hewitt (1926a).

² *vide* Loveridge, see Remarks below.

Size. Total length of largest, 285 (65 + 220) mm., but exceeded in body length by one (M. C. Z. 45481) 284 (70 + 214) mm.

Remarks. This fine specimen received from Stellenbosch University, and presumably taken in that vicinity, agrees with the typical form in points (a) and (c) of Hewitt (1926a) but with his race *bilineatus* in points (b) and (d), i.e., the frontal is twice as broad as long, the fore limb extends back to $8\frac{1}{2}$ ventral rows, the hind limb extends back along 10 caudal scales. It would rather appear as if the race has been founded on somewhat slender grounds.

Enemies. In gullet of Secretary Vulture (Andersson).

Habits. Exceedingly quick and difficult to catch (Rose). Since the serpentiform gliding movements are so rapid, it is impossible to say whether the tiny legs play any part, but at rest the lizard sometimes raises itself by means of its limbs (Essex).

Habitat. Grassy mountain slopes.

Localities. **Cape Province**, western: Franche Kraal, Gans Bay; Hout Bay; Lions Head; Namaqualand (?); Robertson; Worcester Division.

Bocage's (1896c) recording of *Scelotes bipes* and this species from Linokana, Transvaal, is almost certainly erroneous, as pointed out by Hewitt (1910c, p. 106) for these species are otherwise known only from southwestern Cape Province. The identification rather than the locality seems to be at fault, however; we can idly speculate that he had a juvenile *Gerrhosaurus f. flavigularis*, which is abundant at Linokana according to Power, or possibly that he had either of the Transvaal species—*eastwoodi* or *breyeri*—neither of which then were known. Neither has 4 digits on the anterior limb, however, being 3 and 2 respectively.

Range. Western Cape Province.

TETRADACTYLUS TETRADACTYLUS BILINEATUS Hewitt

- 1926a. *Tetradactylus bilineatus* Hewitt, Ann. S. Afr. Mus., 20, p. 417: Burghersdorp district, Cape Province.
- 1927b. Hewitt, p. 454.
- 1935. Lawrence, p. 44.
- 1937e. Hewitt, p. 43.

Description. Habit serpentiform; limbs tetradactyle, very short, the fore limb extending back over 9 ventral rows, the hind limb extending back to the ninth row of caudals; tail injured in holotype.

Nostril bordered only by 3 nasals of which the lowest is elongated, excluding the first labial; frontal about twice as long as broad; dorsals

strongly striated, keeled, in 14 longitudinal and 63 transverse rows; ventrals keeled, in 6 longitudinal rows; femoral pores 4-5 on each side.

Coloration. Above, olive brown; head spotted with dark brown; a dark brown dorsolateral line separated from its fellow by 3 scales, i.e. the two median dorsal scales and inner half of the third being without pigment. Below, pale olive.

Size. Total length of holotype from snout to anus 53 mm., tail injured.

Remarks. See those under the typical form.

Localities. Known only from the type in Albany Museum.

Range. Eastern Cape Province.

TETRADACTYLUS EASTWOODAE Methuen & Hewitt

1913c. *Tetradactylus eastwoodae* Methuen & Hewitt, Trans. Roy. Soc. S. Africa, **3**, p. 109; Woodbush, Zoutpansberg District, Transvaal.

1927b. Hewitt, p. 454.

1935. Lawrence, p. 44.

Description. Habit serpentiform; limbs very short, the anterior with 3 clawed digits, median longest, the posterior with two clawed digits, inner minute; reproduced tail about 2 times the length of head and body.

Dorsals strongly striated, keeled, in 12' longitudinal and 67 transverse rows; ventrals in 6 longitudinal rows; femoral pores 3 on each side.

Coloration. Above, head spotted with black, otherwise uniform brown. Below, pale grayish brown.

Size. Total length of holotype, 190 (64 + 126) mm., but tail partly reproduced; fore limb 5 mm.; hind limb 6.5 mm.

Remarks. The authors state that the head shields resemble those of *T. africanus*, but that the interparietal is more elongated, separating the frontoparietals and forming a suture with the frontal.

Localities. Known only from the holotype (Tvl. Mus. 1496).

Range. Transvaal.

TETRADACTYLUS BREYERI Roux

1907b. *Tetradactylus breyeri* Roux, Zool. Jahrb. Syst., **25**, p. 430, pl. xiv, fig. 6: Transvaal.

1910b. Boulenger, p. 481.

1910a. Hewitt, p. 62.

1910c. Hewitt, pp. 103, 105.

1927b. Hewitt, p. 454.

1935. Lawrence, p. 44.

Description. Habit serpentiform; limbs short, the anterior with 2 clawed digits of which the second is only slightly developed, the posterior is undivided, without claw; tail about 3 times the length of head and body.

Nostril bordered only by 2 nasals, the first labial being excluded; dorsals and caudals striated, keeled, in 12 longitudinal and 70 transverse rows; ventrals in 8 longitudinal rows; femoral pores 2 on each side.

Coloration. Above, brown, sides of neck and body anteriorly with black vertical bars; a dark brown line from eye to insertion of fore limb, and a brown dorsolateral line from above fore limb extending on to tail. Below, olive.

Size. Total length of holotype, 222 (56 + 166) mm.; forelimb 4.5 mm.; hind limb 4 mm.

Remarks. For further details consult original description.

Localities. **Natal:** Umvoti (S.A.Mus.); Weenen County (Tvl. Mus.); **Transvaal.**

Range. Natal north to Transvaal.

TETRADACTYLUS AFRICANUS (Gray)

- 1838. *Caita africana* Gray, Ann. Nat. Hist., 1, p. 389: Cape of Good Hope, i.e. South Africa.
- 1849. Smith, A., pl. lxxvi, figs. 1-1c.
- 1887a. *Tetradactylus africanus* Boulenger, p. 125, pl. iv, fig. 3.
- 1898. Selater, p. 105.
- 1898. Werner, 1896-7, p. 142.
- 1901. Gadow, p. 559.
- 1908b. Boulenger, p. 226.
- 1910b. Boulenger, p. 481.
- 1910a. Hewitt, p. 62.
- 1910c. Hewitt, pp. 103, 105, 106.
- 1915. Hewitt, p. 102.
- 1927b. Hewitt, p. 454.
- 1928a. Essex, 1927, p. 912, figs. 35-38.
- 1935. Lawrence, p. 44.

Description. Habit serpentiform; limbs minute, undivided; tail about 3.4 times the length of head and body.

Dorsals strongly striated, keeled, in 14 longitudinal and 60-62¹ or

¹ *vide* Boulenger (1887a), but considered a misprint by Hewitt (1915) and FitzSimons (1942, in letter), the latter finding 70-72 in the three examples in the Transvaal Museum.

69-72 transverse rows; ventrals in 6 longitudinal rows; femoral pores 2-3 on each side.

Coloration. Above, olive or reddish brown; upper lip pale lemon yellow; temple and side of neck with dark brown vertical bars; back with dark brown longitudinal lines; side of body and lateral fold anteriorly lemon yellow. Below, pale olive.

Size. Total length of a cotype, 322 (72 + 250) mm.

Anatomy. Essex figures the pelvic girdle and bones of fore and hind limbs.

Remarks. Hewitt (1915) states that an *africanus* from Witzieshoek, near Harrismith, has 69-70 dorsals in transverse series like *fitzsimonsi*, but possesses a broader interparietal than that species and lacks dark spots upon its head.

Habitat. Grassland.

Localities. **Natal:** Durban; Harrison, (T. Mus.); Umvoti; Witzieshoek. **Zululand:** Eshowe (T. Mus.); Melmoth.

Boulenger's (1910b) records of Little Namaqualand and Bocage's (1895a) Angola are omitted pending confirmation by other workers.

Range. Natal north to Zululand.

TETRADACTYLUS FITZSIMONSI FITZSIMONSI Hewitt

1915. *Tetradactylus fitzsimonsi* Hewitt, Ann. Transvaal Mus., **5**, p. 101: Schoemachers Kop, near Port Elizabeth, Cape Province.

1927b. Hewitt, p. 454.

1935. Lawrence, p. 44.

1937e. *Tetradactylus africanus fitzsimonsi* Hewitt, p. 44.

Description. Habit serpentiform; fore limbs absent; hind limbs minute, undivided, terminating in a claw, length of hind limb slightly less than half the distance from snout to tympanum; reproduced tail about 3.3 times the length of head and body.

Head shields smooth; dorsals strongly striated, keeled, especially the two median rows, in 14 longitudinal and 69-70 transverse rows; ventrals in 6 longitudinal rows; femoral pores 2-3 on each side.

Coloration. Above, olive, head and neck spotted with darker; temple and side of neck with dark vertical bars. Below, pale olive to grayish brown.

Size. Total length of type, 175.5 + (78.5 + 97 +) mm., a second specimen 309 (72 + 237) mm.; hind limb of type 5 mm.

Localities. **Cape Province:** Schoemacher's Kop, near Port Elizabeth.

Hewitt also records a paratype with doubts from Kroonstad (whether that in the Orange Free State or the Transvaal not stated); later he (1937e) evidently rejects this entirely for he states that the species is known only from Port Elizabeth. FitzSimons (1942, in letter) supports Hewitt's view.

Range. Cape Province.

TETRADACTYLUS FITZSIMONSI BOULENGERI Witte

?1895a. *Caita africana* Bocage (? not Gray), p. 37.

?1937b. *Tetradactylus africanus* Monard (? not Gray), p. 77.

1933f. *Tetradactylus Boulengeri* de Witte, Rev. Zool. Bot. Afr., **23**, p. 186:
Kansenia, Pande Valley, Katanga, Belgian Congo.

1933m. Witte, p. 75.

1937b. *Tetradactylus lundensis* Monard, Arquiv. Mus. Bocage, **8**, p. 79:
Lunda, Upper Tyiumbwe River, eastern Angola.

Description. Habit serpentiform; fore limbs absent; hind limbs minute, undivided, terminating in a claw, length of hind limb slightly less than a quarter the distance from snout to tympanum; tail from 3 (*boulengeri*) to 3.7 (*lundensis*) times the length of head and body.

Head shields strongly striated, keeled, especially the two median rows, on most of the body, the striae most pronounced anteriorly diminishing posteriorly till on the tail only faint traces of them remain, in 12 longitudinal and 64 transverse rows; ventrals in 6 longitudinal rows; femoral pores absent.

Coloration. Above, brownish olive; head shields edged and spotted with black; temples and side anteriorly with black vertical bars; the two median vertebral rows of keels brown; a bluish lateral band commences on snout but does not extend beyond anterior third of body, scales on this band are edged and spotted with black. Below, bluish, or whitish tinged with yellow on the throat.

Size. Total length of holotype of *boulengeri*, 266 (66 + 200) mm., of type of *lundensis*, 248 (53 + 195) mm., length of hind limb 2 mm. for both specimens.

Remarks. Witte states that *boulengeri* differs from *fitzsimonsi* in having more strongly striated head shields, fewer dorsals, and no femoral pores. Later he compared it with one of the type series of *lundensis* and remarked (in Monard) that the shape and proportion of the interparietal, which is triangular and broader than long in *boulengeri*, rhomboidal and half as broad as long in *lundensis*, together with the striations of the head shields, parallel in *lundensis*, ramified in *boulengeri*, were the only differences which he could detect.

No one has examined these lizards to ascertain whether these differences are not attributable to sex or age, and though I have not had the opportunity of seeing the types, these differences scarcely seem of specific importance, with more material *lundensis* may yet be accorded subspecific rank.

Localities. **Angola**, eastern: Lunda. **Belgian Congo**: Kansenia.

Bocage's (1895a) record of *africana* from Banks of "Quando River" (? Kwando), Angola, is questionable, the specimen should be re-examined.

Range. Eastern Angola and southern Belgian Congo.

Genus PARATETRADACTYLUS

1922b. *Paratetradactylus* Angel, Bull. Mus. Paris, **28**, p. 150, figs. 1-4 (type *ellenbergeri*).

Tongue covered with oblique plicae converging anteriorly towards the median line; nostril pierced between a single nasal, ? first labial, and very near rostral; prefrontals present; frontoparietals present; lower eyelid scaly; dorsal and ventral scales forming straight longitudinal and transverse series; a strong lateral fold; no fore limbs; hind limbs minute; no femoral pores.

Obviously very closely related to *Tetradactylus fitzsimonsi boulengeri*, the sole representative of the monotypic genus *Paratetradactylus* presents a further stage in the process of serpentine development, except for the retention of prefrontal shields.

Range. Northern Rhodesia.

PARATETRADACTYLUS ELLENBERGERI Angel

1922b. *Paratetradactylus Ellenbergeri* Angel, Bull. Mus. Paris, **28**, p. 151, figs. 1-4: Barotseland, Northern Rhodesia.

Description. Habit serpentine; fore limbs absent; hind limbs minute, undivided, terminating in a conical scale, length of hind limb less than the horizontal diameter of the orbit; tail about 3.3 times the length of head and body.

Head shields more or less regularly striated; prefrontals broadly in contact; frontal twice as long as broad in middle, longer than its distance from end of snout, longer than parietals; frontoparietals and interparietal present; nuchal scales with from 3 (lateral) to 8 (dorsal) striae but without keels; dorsals striated and with a strong

median keel, in 14 longitudinal and 65 transverse rows; ventrals smooth, in 6 longitudinal rows; femoral pores absent; caudal scales, both above and below, without striae, but with a strong median keel.

Coloration. Above, slightly bluish olive; temples spotted with brown; the two median vertebral rows of keels brown, these lines continuing on to the tail anteriorly. Below, pale olive.

Size. Total length of holotype, 280 (64 + 216) mm.; length of hind limb 2 mm.

Remarks. For further details of this interesting offshoot of *Tetradactylus* of the *fitzsimonsi* formenkreis, consult the original description.

Localities. Known only from the holotype (Paris Mus. 1921-514).

Range. Northern Rhodesia.

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of 186 works mentioning African gerrhosaurids from 1758-1941,
but no attempt has been made to complete those prior to 1880

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